Engineering
Arts

FACTORY

MANAGEMENT AND MAINTENANCE

A McGRAW-HILL PUBLICATION

NOVEMBER 1942

WHAT ARE MANNING TABLES?

A new government plan to help your draft problem — PAGE 74

Here's another

WAR TIME INDUSTRIAL JOB FOR RADIANT HEATING

. . . and for

BYERS WROUGHT IRON

What this country needs today are "tight-wad" engineers . . . thrifty not in money, but in materials. Every pound of metal used unnecessarily is a blow to the war effort, and conservation is a patriotic duty.

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Corrosion costs you more than Wrought Iron

BYERS GENUINE WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

STEEL TUBULAR PRODUCTS

FACTORY
MANAGEMENT AND MAINTENANCE
NOVEMBER 1942

WHAT ARE MANNING TABLES?
A new government plan to help your draft problem—page 74

This month's cover is a tribute to the women in industry who are doing men's jobs—and doing them well. The girl is a roving inspector at a GE plant that makes starting mechanisms for torpedoes. Her job calls for the possession of unusual skills and the exercise of keen judgment. Kodachrome by courtesy of General Electric Company.

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FACTORY

MANAGEMENT AND MAINTENANCE

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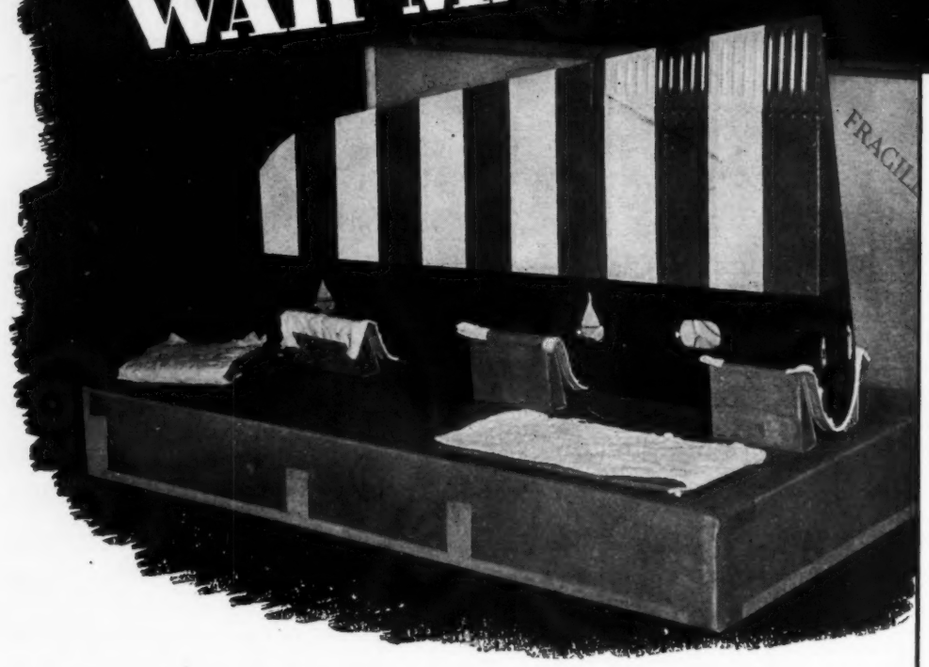
WHO KNOWS HOW TO PACK WAR MATERIALS ?



A FEW OF THE WAR MATERIALS WE'RE PACKING TODAY

- Airplane Wing Tips
- Anti-Tank Mine Parts
- Army Cots
- Army Field Jackets
- Automatic Pilots
- Bayonets
- Binoculars
- Blankets
- Bullet-proof Gas Tanks
- Cartridge Cases
- Communication Systems
- Field Gun Yokes
- Field Rations
- Flare Fuses
- Floodlights
- Gas Mask Cans
- Gun Mounts
- Hand Grenades
- Hats and Caps
- Incendiary Bombs
- Machine Gun Reels
- Machine Gun Rings
- Mosquito Bars
- Nose Assemblies
- Practice Bombs
- Projectiles
- Rifles
- Rotary Bands
- Shell Cases
- Shell Windshields
- Skis
- Sleeping Bags
- Underwear
- Uniforms

THROW YOUR SCRAP INTO THE FIGHT!

WE DO. Yes, we know how to pack war materials because we're packing many different war items every day. Hinde & Dauch has the experience, the talent, the ability, to design and manufacture corrugated boxes to meet the exacting specifications war products demand.

If you're making war materials for the armed services, turn your packaging problem over to H & D. There's no red tape, no guessing, no trial and error. We know how to pack war materials because we're packing them—hundreds of them. For fast service and complete information, write the factory nearest you.

Send for "How To Pack It"—
the authoritative book on packing.

BETTER SEE H&D *Authority on Packaging*

HINDE & DAUCH —4247 DECATUR STREET, SANDUSKY, OHIO

FACTORIES IN BALTIMORE • BOSTON • BUFFALO • CHICAGO • CLEVELAND • DETROIT • GLOUCESTER, N. J • HOBOKEN
KANSAS CITY • LENOIR, N. C. • MONTREAL • MUNCIE • RICHMOND • ST. LOUIS • SANDUSKY, OHIO • TORONTO

Construction—Builder of Bases

America's Great Peacetime Industry Goes to War

PUNCHED through 1,600 miles of trackless wilderness and rivaling the Panama Canal in strategic importance, the Alaska Highway will cut days and dangers from present supply routes . . . to Alaska . . . to the Aleutians . . . yes, to Japan itself!

This job, to be finished soon and well ahead of schedule, is but one example in thousands illustrating how construction sets the stage for our war effort . . . and why the construction engineer is vital to victory.

Back of America's busy production lines, expanding shipyards, growing cantonments and far-flung military bases is a series of swiftly executed construction jobs. Important jobs! ***For the construction industry is a builder of bases. Bases for production—for training—for defense—and for attack.***

To conceive and to carry through so tremendous a program in a race against time is typically American. It requires enterprise and the sort of versatility that has been acquired by undertaking every kind of job; from a Boulder dam to a drydock, from a Pennsylvania Turnpike to a housing project, from a Radio City to a railroad tunnel . . . and taking it in stride. War's demands in the eyes of America's construction men, are simply more of the same—for a grimmer purpose, and under heavier pressure.

The civil engineers who develop the necessary designs, the contractors who execute them and the manufacturers who provide the equipment and materials, are as much a part of this war as are the men who face the enemy. The results of their labors are recorded in mounting production figures, and will be indelibly written in the military annals of this war. Those 60,000 airplanes, 45,000 tanks and 8,000,000 tons of shipping that the President asked for in 1942 will be supplied because—and only because—the construction industry did a Herculean plant-building job first—and fast.

This is the fifth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Yes, construction, America's great peacetime industry, has gone all out for war. From a normal 6½ billion dollars in 1938, it got into its war stride last year with a 11½ billion dollar volume. And under the impetus of Pearl Harbor, the 1942 figure now promises to reach the unprecedented total of 15 billion dollars. "If buildings would win the war, Hitler would be licked now", said Lieut. Gen. William S. Knudsen recently. Which emphasizes the further fact that the construction industry was the *first* to go to war.

The technical and managerial talent that is accomplishing this mammoth job has had to find its strength and resources within itself. No possibility of "conversion" here! Only years of varied construction experience enabled it to tackle and to achieve the manifold tasks that building for war demands.

Take that cornfield, for instance, that Henry Ford picked for his record-breaking bomber plant. The spring mud was soft and deep when contractors moved in last year. They were entering a race against an almost impossible time limit. Before they could even begin on the plant itself, they had to build roads, lay a 4-mile water supply line and install a complete sewerage system with its disposal plant. But such varied jobs—each big in its own right—merely were antecedent to running up the framework and enclosure for the 60-acre factory itself. Or to using road-building methods to pave a floor that was the equivalent of 25 miles of 20-foot wide concrete highway.

It was a race against the approaching winter, and to win it they had to push their $1,000,000 worth of construction equipment to the limit—day and night. But win they did! It is accomplishments like these that explain how the nation's aviation factory floor space jumped from 18,000,000 to 60,000,000 square feet in

the past two years . . . why Fortresses and fighter ships are beginning to turn the scales of war in our favor.

"Somewhere in the Southwest" the Army called for a training base. The contractor who answered that call summed up his performance in characteristic fashion: "Beginning without so much as a contour map we had a $10,000,000 project ready for operation within 90 calendar days, and saved 3½ million dollars of the estimated cost".

At another Army camp a contractor assembled a crew of 20,000 men who put together 1,400 buildings in 125 working days, along with a sewer system, a water-supply and a street layout of which many a fair-sized city might be proud. This job swallowed up 2,000 carloads of lumber, and 26,000 kegs of nails. So perfect was the teamwork, from the general manager down through the hundreds of superintendents and foremen to the specialized crews, that as many as seventy buildings were erected in one single day.

But versatility and experience are not the only qualities that the construction engineer has in his tool chest. He has ingenuity, and he needed it when steel, copper, zinc and aluminum had to be used for combat equipment, and were denied him. Great hangars, conventionally of structural steel, were turned out with record-breaking timber arch spans. Reinforced concrete factories were designed to require only 3 lb. of steel bars per square foot instead of the customary 5 lb. Asphalt-impregnated paper was substituted for copper in flashings, cement-asbestos for galvanized steel in duct work. In the face of a materials shortage, he continued to build bases—safely, economically, and on time.

Construction ingenuity, too, is back of the records in Liberty ships, in war housing and a host of other facilities. Indeed, it was the construction industry that stepped forward to assume the bulk of the emergency shipbuilding program, leaving established yards free to handle more specialized Navy work. Naturally, it was easy for civil engineers and contractors to build the shipyards, but building ships was another story. It is a far cry from steel ships to conventional engineering structures, yet, drawing upon their bridge and building experience, the men of construction have turned out ships faster than they were ever built before.

How was this possible? . . . because the construction man sees every job as a new problem, views every precedent as something to be discarded in favor of something better. So instead of assembling the myriad separate pieces of each ship on the ways, he fabricated them into huge built-up sections. These he swung to the ways and welded them into place in a fraction of the time required by old methods.

Again, the demands for wartime housing for workers in industrial areas, at Navy bases, and near Army concentrations, have altered the meaning of "residential construction". The building of individual houses has given way to a form of multiple-unit project that calls for the skilled services of the architect, the civil engineer and the large contracting organization. On one such project, for example, a contractor experienced in large building and bridge construction employed an extensive system of prefabrication and site assembly that made possible the completion of 5,000 houses for war workers within five months.

All these activities, within the United States, parallel the achievements of other industries that serve the men at the front. But construction knows no continental limits. Its men are serving throughout the network of defense bases built in the West Indies, Greenland, and Iceland, and in the offensive bases that are taking form in the jungles and deserts of Africa, the harbors of the Persian Gulf, and the plains and mountains of Australia and Alaska. Already in this war, as in the last one, construction crews, like those at Wake and Guam, have dropped their peacetime tools to fight shoulder to shoulder with their comrades in uniform. Construction follows the flag to the farthest outposts in this global struggle.

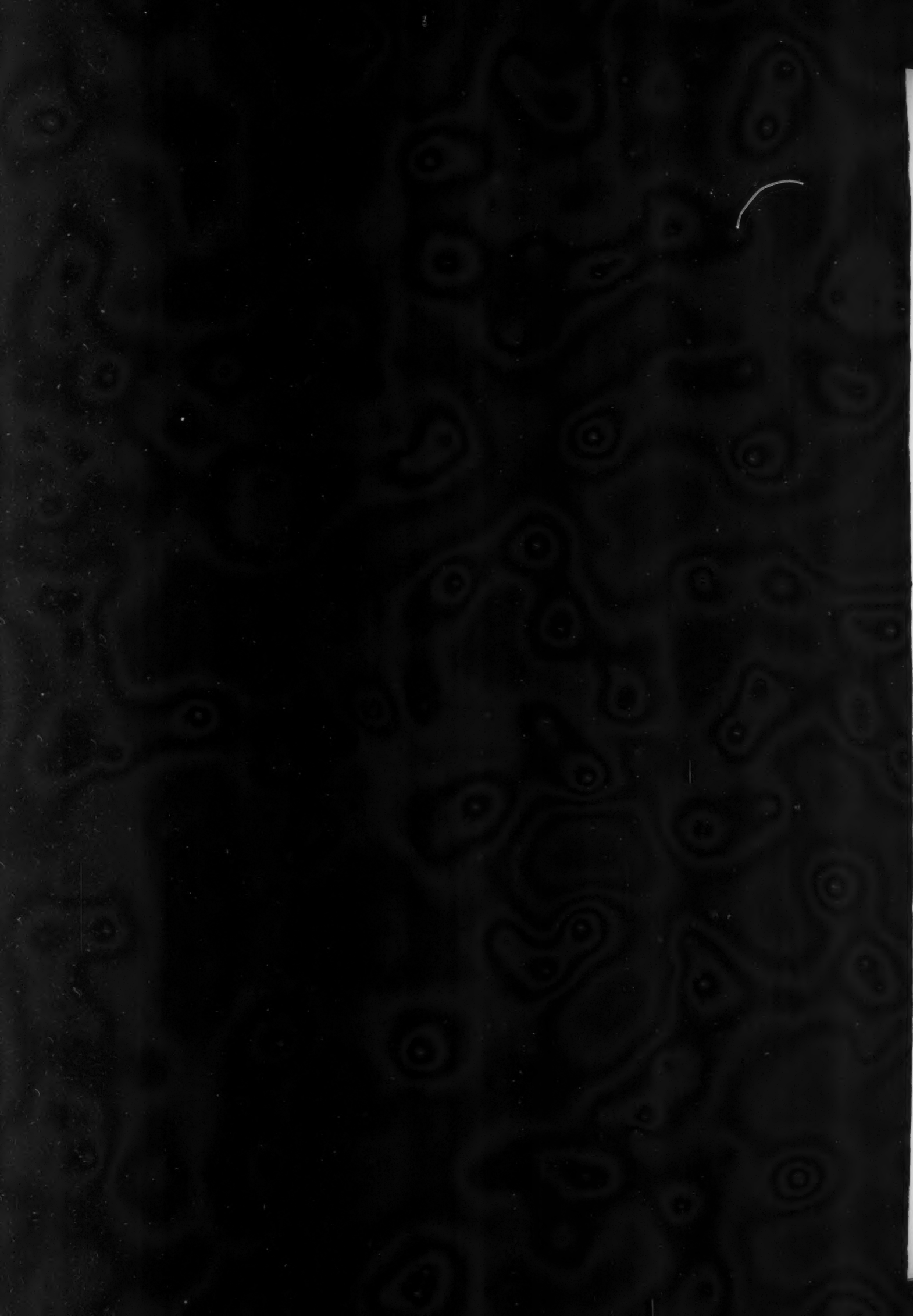
* * * *

But while the construction industry thus serves the special needs of the armed forces, it must look after its job at home. It must keep the highways serviceable, the water supply safe, sanitary facilities adequate. There are home chores that cannot be neglected even in war.

And when we finish our No. 1 task of winning the war, the construction industry will again be called upon to help re-establish peacetime employment and to stimulate the normal industrial activities of the nation. It will raze, redesign and rebuild; it will bring modern sanitation to urban dwellers; it will safeguard fertile areas and cities from disastrous floods; it will improve all forms of transportation; it will design and build the facilities that will be needed to reconvert from war to peace. Its vision, versatility, experience and ingenuity will be as indispensable then as they are vital now.

Today it is building the bases that are needed back of every battle-line. Tomorrow it will build for a new and better era. Today it is laying the foundation for the victories that must be ours. Tomorrow it will lay the foundation for the peace that will follow these victories. In war and in peace the construction industry is the builder, the harnesser of nature's forces.

President, McGraw-Hill Publishing Company, Inc.



The NIAA

Victory Plan

★ Back of every soaring production record, you'll find one basic cause: **Somebody has done a good job of making others understand what needs to be done, how to do it, and why.**

Think this over. It accounts in no small measure for the miracle of American production.

At the outset, the Axis industries had a good long lead on us. Yet, starting from scratch, we took millions of raw recruits and drilled them into an army of productive industrial war workers. Then, changing national habits of thought overnight, we salvaged and conserved materials—by the millions of tons.

How? By translating ideas and facts into action:

By the exchange of ideas and facts not merely from man to man, but also from thousands of leaders to millions of workers.

Through the use of verbal and visual appeals, through the techniques, if you please, of advertising.

Ideas are bullets. Facts are bombs. We've got a use for them and a way of using them that the Axis simply hasn't got and can't get. And we've got, already mobilized, a corps of skilled marksmen, long versed in the art of aiming ideas and facts straight at the target—marksmen who

have done and are now doing outstanding work in the war of production.

This corps of marksmen is enrolled in the 25-year-old National Industrial Advertisers Association with approximately 2000 members in active chapters in 25 leading industrial centers. These men, under the leadership of their war activities committee, are now marshaling their forces to support operating management in American industry's coming new production offensive.

For they recognize, as you do, that more millions must be trained, that these millions must be **made to understand** their real role in the war effort, and that more and more of industry's equipment and materials must be conserved.

The advertising manager in your plant is probably a member of the National Industrial Advertisers Association. As such he is especially prepared for the new offensive because of his Association's recently announced VICTORY PROMOTIONS PLAN.

Three of the plan's four objectives are of the utmost interest to plant operating men:

1. **War Production Drives**
2. **Industrial Training**
3. **Conservation and Salvage**

NIAA's members are already engaged in pooling information and exchanging records of successful attacks on these problems. They know, as you know, that in a democracy the techniques of mass education can be used to elicit voluntary action and to inspire production.

Yours is the responsibility for the **strategy** of production, theirs the responsibility of implementing that strategy with skilled use of the weapons in which they are specially trained.

They are your aides-de-camp, your liaison officers, trained to relieve you of the details of a critical and vital operation.

Call them into your staff conference today. They stand ready especially to aid labor-management committees and all other plant committees engaged in training, conservation, and all such special war efforts which depend upon making others understand what needs to be done, how to do it, and why.

The Editors of FACTORY

FACTORY
MANAGEMENT AND MAINTENANCE

L · C · MORROW · EDITOR

The Challenge to Production

Industry faces the problem of how to get out greatly increased production while at the same time enough manpower is made available to the armed forces and to agriculture. It is a national policy that the male youth must constitute the major portion of the armed forces. It is this same classification of manpower that is the most productive in many of our factories, yet which must be released for fighting.

Part of the answer to the problem, as everyone knows, is the employment of more women, older men, and partially disabled men. Another part is the carrying on of production drives, aimed to build and maintain a morale that will call forth the best efforts of workers.

The procedures called for by these two parts of the answer are indispensable. Fortunately, considerable progress already has been made in adopting them. But one calls for merely a change in the personnel, while the other (if the employee suggestions feature may be disregarded for the moment) calls principally for increased output from the individual's added physical effort.

There is a third part of the answer which seems to possess greater potential results than generally realized. It is the transfer from person to machine of the burden of output, measured both quantitatively and qualitatively. It is this transfer at which the employee suggestion systems are being aimed.

In the final analysis there is a limit to physical exertion beyond which no feeling of loyalty or patriotism can drive the individual. That is not so with machines; by and large their output is limited only by the ingenuity of the production management forces that devise the methods and tools by which the output obtained from them is controlled. It is production management's responsibility to put at the disposal of workers the very best equipment, tools, and methods that can be obtained and devised. Doing so involves not only maximum effort in tool design, but also thorough use of all the appropriate ramifications of methods engineering.

To secure more production per unit of human-energy input now is essential because of the shortage of manpower. It is also in keeping with the revised over-all war procurement program. A year ago the procurement objective was simply "production." Today it is "planned production."

This change affords industry increased opportunity to apply to war production the basic principle of the machine age: Let the machine do the work. A year ago there was little concern about the cost in man-hours. Today the biggest single question worrying the nation is, "Where is the manpower coming from?" Production management must find the way to produce more per manpower unit.

L C Morrow

MANNING TABLES . . . to help you plan orderly withdrawals and replacements as Selective Service makes deeper and deeper inroads into your working force

A plan developed jointly by the War Manpower Commission and the Selective Service System

THE UNITED STATES GOVERNMENT is now urgently asking industry to think of the nation's manpower supply in terms that are entirely new.

Heretofore labor availability has been one of the less considerable factors in a manufacturer's plans.

Henceforth it will be paramount. The long-predicted general shortage of manpower is visibly at hand. These are some of the signs:

The "certificate of release" procedure is introduced to enforce an "employment stabilization" order invoked to save the sagging curve of production in copper mines. Anti-pirating agreements prevail in certain industrial centers. Women invade new pursuits in a way that only a shortage of men could make possible; they handle heavy forgings in machine shops, enter the logging industry. And in California thousands of cows are slaughtered because farmers fear shortages of experienced men and men and women to milk them.

We should avoid the alarmist outlook, by all means. But one need not be an alarmist to recognize in these facts a need for planning.

To say the least, then, the tension already evident in the labor market provides certain clues to the manpower problem that lies ahead. The chart on page 82 shows the "national labor force" to be what the statisticians so often call it, a "highly expansible thing."

And that is really just about all anybody knows about it. The total labor force (including the armed services) has hit a peak above 58,000,000. Yet this falls far short of the minimum 62,300,000 that will be reached by December, 1943. Beyond this, further expansion may prove necessary—if it proves possible.

A Host of Variables

Meanwhile men in government who are making manpower policy must contend with a host of imponderables and variables, many of which lie wholly beyond the possibility of anything close to accurate prediction.

Only these things are reasonably clear today:

1. Practically all men of military age and fitness *must* enter the armed forces of our country.

2. Replacements for essential industry *must* be drawn from the reserve labor force.

3. To achieve the minimum indicated expansion, intensive regulation will be needed. To increase, or even to maintain it, *total* regulation will be required.

But—how many military men? what replacements? when?

For example, the estimated armed services total of 9,000,000 may well lie far below the mark. The estimated backlog of 13,000,000 potential workers in the reserve labor force is, at best, only a guess, and their actual employability can be ascertained only in practice. Finally, the answer to all these questions must depend in large part on developments along all

the seven fronts on which our overseas armies are fighting today.

The very fact that these questions cannot be answered exactly makes it plain that some sort of regulation is imperative.

Because time is short, we must both plan and act at once. We must take a continuing inventory of essential industry's manpower needs as we withdraw and replace workers.

To assist essential industry in the concurrent process of withdrawals and replacement, and in taking manpower inventory, the government has prepared the Manning Table Plan. Worked out by the War Manpower Commission in cooperation with the Selective Service System, the plan represents, in the opinion of the sponsoring officials, the first, long, forward step toward a systematic solution of essential industry's manpower problems in any war situation.

FACTORY is privileged to present a detailed exposition of this plan in the following pages.

Manning Tables: Questions and Answers

1. What is the Manning Table Plan?

It is a plan to provide for the listing of the personnel requirements of essential war industries according to job classifications. *This means a listing of jobs, not men.*

2. What are its immediate objectives?

To facilitate the orderly withdrawal of replaceable workers from essential industries into the armed services in the inverse order of their essentiality, and to provide for their replacement by workers taken from reserve labor sources with the least possible disturbance to production.

3. What are its further objectives?

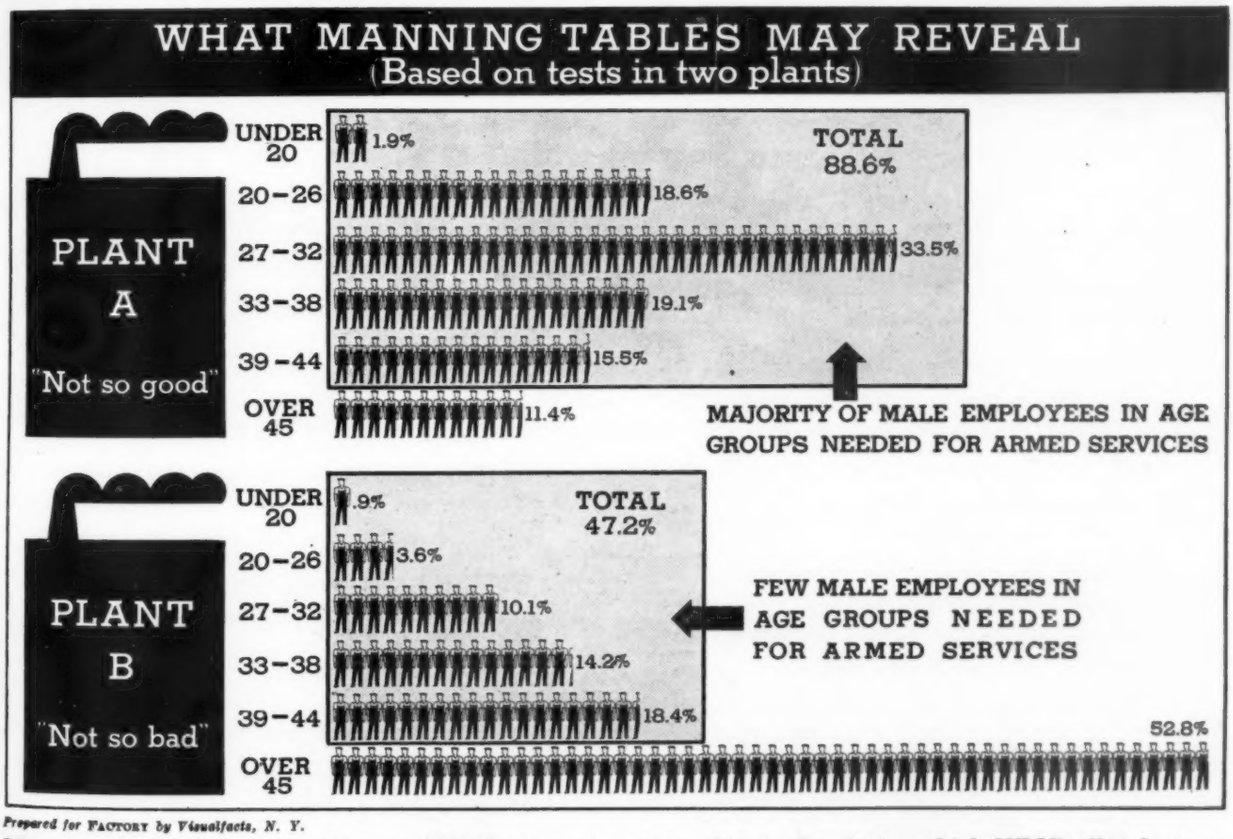
To provide the basis of a complete inventory of essential manpower needs; to reveal to employers the necessity and the opportunity for training and upgrading of workers; to call to their attention ways in which women, older workers, and handicapped workers may be utilized; and to provide the necessary data for a reasonably accurate forecast of future labor requirements.

4. How will it operate?

It will provide the justification for deferment of men in essential positions when such action is in accordance with Selective Service regulations. A Manning Table is prepared by an employer and is then officially validated. After that it serves as a guide to local Selective Service Boards in determining deferments.

5. How was the plan developed?

It was worked out cooperatively by the War Manpower Commission and the Selective Service System. It



Prepared for FACTORY *by Visualfacts, N. Y.*

Manning Table data may show maldistribution of employees by age groups, as does Plant A—highly vulnerable to the draft—which WMC officials term "not so good." The plants are in the same company

has since been endorsed by the Management-Labor-Policy Committee of the War Manpower Commission.

6. Who will participate?

Manufacturing plants whose business volume is 75 percent or more in war work, and certain essential industries such as utilities and railroads. National and regional industrial groups and trade associations will assist in passing upon applications and determining some job classifications.

7. What is the procedure?

A prospective applicant obtains, fills out, and returns a Manning Table application issued by the Regional or Area Director of the War Manpower Commission nearest him (see map on page 77). If the application is approved, the applicant will receive five copies of a Manning Table with instructions for compiling it. A Manning Table is filled out for *one plant*, not a department and not a company having several plants.

The applicant retains one copy and forwards the other four to the Regional or Area WMC Director who arranges for validation, retains one copy, sends one to the State Director of Selective Service, one to the Area Director of the United States Employment Service, and one to Washington.

For Selective Service procedure, after validation, see "Manning Tables and Selective Service" on facing page.

8. How are jobs to be classified?

In general, the code references of the *Dictionary of Occupational Titles* will be used (see instructions on page 78), but employers may file their own job descriptions if they wish (see "How to Prepare a Job Description" on page 81).

9. How will Manning Tables be kept current?

By periodic review of not less than each six-month period and by special review whenever the personnel requirements of a plant are substantially changed.

10. Has the Manning Table Plan been tested?

Yes. Experimental applications have been made in industry, notably by the Carnegie-Illinois Steel Company, working in conjunction with the American Iron & Steel Institute, as well as in certain divisions of General Electric Company, Eastman Kodak Company, Bausch & Lomb Optical Company, Briggs Manufacturing Company, American Locomotive Company, and the Koolsman plant of Square D Company.

11. Is participation voluntary?

Purely so. Officials point out that the plan is still experimental and may change in detail but not in essence.

WHERE TO OBTAIN M

Applications for participation in the Manning Table Plan may be obtained by addressing:

Regional Director, War Manpower Commission

at the adress listed below for the region in which your plant is located.

The addresses marked with an asterisk are temporary ones. In addition, area offices will be opened within the regions.

REGION I — Maine, New Hampshire, Vermont, Connecticut, Rhode Island, Massachusetts
10 Post Office Square Building, Boston*

REGION II — New York
c/o Social Security Board Office,
11 W. 42nd St., New York

REGION III—Pennsylvania, Delaware, New Jersey
750 Suburban Station Building,
1617 Pennsylvania Blvd., Philadelphia

REGION IV — Maryland, Virginia and West Virginia, Washington, D.C., and North Carolina
c/o NYA, 2145 C St., N. W., Washington, D. C.*

REGION V — Ohio, Kentucky, Michigan
521 Union Commerce Building,
Euclid Ave. and E. 9th St., Cleveland

REGION VI — Indiana, Illinois, Wisconsin
c/o Social Security Board Office,
105 West Adams Street, Chicago

REGION VII — Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee
1630 Candler Building, Atlanta

REGION VIII — Minnesota, Iowa, N. Dakota, S. Dakota, and Nebraska
c/o Social Security Board Office,
Midland Bank Building,
Fourth and Second Sts., Minneapolis

REGION IX — Missouri, Arkansas, Kansas, Oklahoma
414 Dierks Bldg., 1006 Grand Ave., Kansas City, Mo.

REGION X — Texas, Louisiana, New Mexico
Post Office Box 957, Austin, Texas*

REGION XI — Montana, Wyoming, Idaho, Utah, and Colorado
728 Patterson Building, Denver*

REGION XII — California, Arizona, Oregon, Washington, and Nevada
245 Furniture Mart Bldg., San Francisco

Manning Tables and Selective Service

THE MANNING TABLE must be accepted by the State Director of Selective Service of the state in which the plant is located, before it is applicable to any Selective Service activity. When the State Director has accepted the plan, he will assign a State Acceptance Number to the employer, who will then be authorized to use this number and to place a prescribed State Acceptance Stamp on the Affidavit — Occupational Classification (Form 42A), indicating that the time for replacement of an employee is in accordance with the table.

When an employer has been notified that his table has been accepted, he is authorized to use the State Acceptance Stamp on the Affidavits (Form 42A) which were filed in accordance therewith. The employer will file Forms 42A for all employees within the ages liable to military service for whom occupational deferment is then necessary. Forms 42A filed under the Manning Table Plan and bearing the authorized state stamp will be forwarded by the employer direct to the local board and will supersede any previous requests for occupational deferment.

The new Form 42A will show how long it will take to replace the employee, the time indicated being taken from the accepted Manning Table.

Until further notice, it will not be necessary to file a Form 42A for registrants who have wives and children or for registrants who have children, with whom they maintain a *bona fide* family relationship.

Shows Training Time

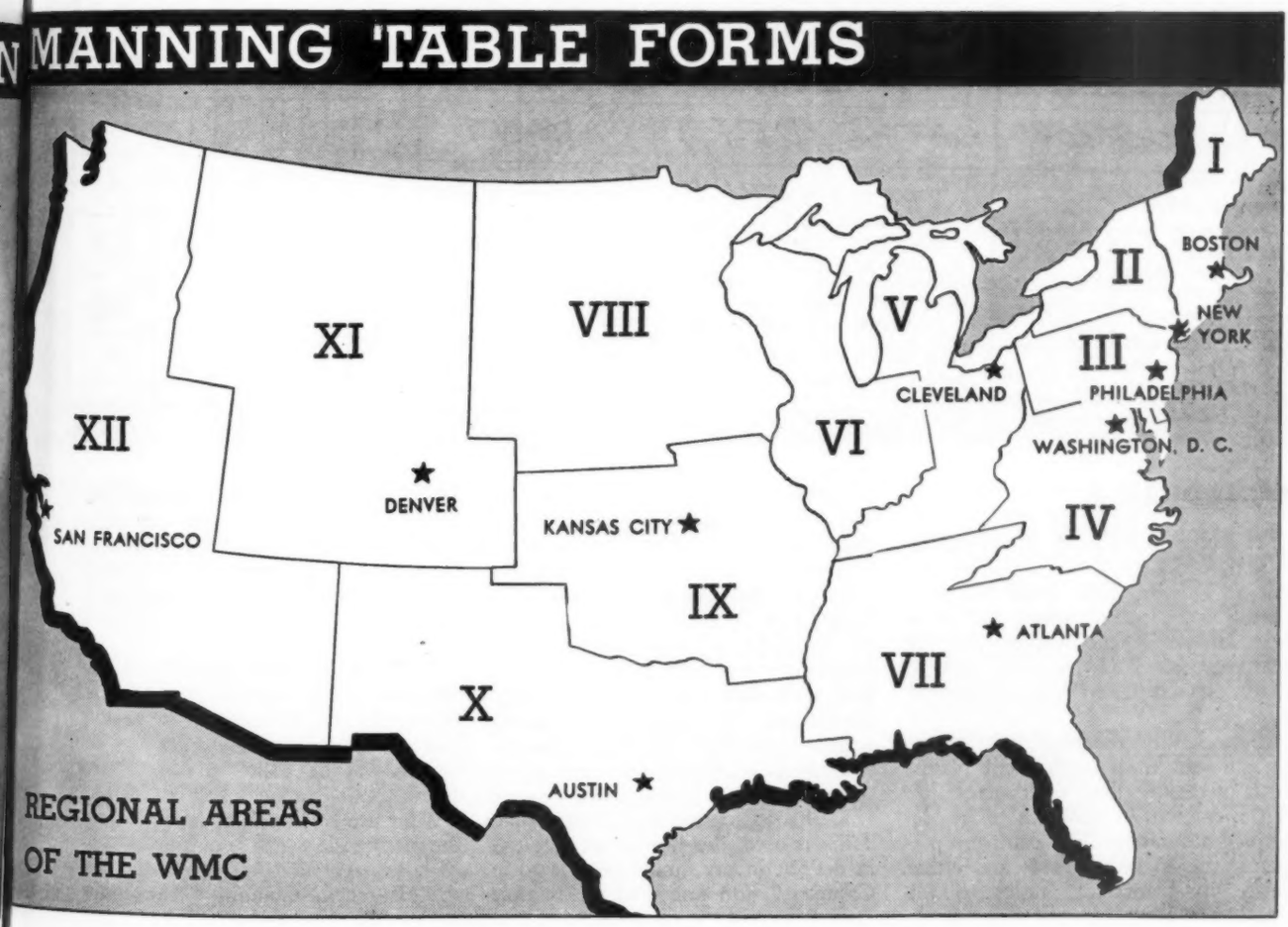
The employer should, however, file an Occupational Certification by Employer (Form 42B) for such employees, and whenever the Director of Selective Service determines that it is necessary to reclassify men in this status, the employer may file a Form 42A. This will enable the local board properly to classify the registrant, and to notify the employer if the registrant is classified or reclassified.

When an employer has filed Form 42A or 42B for a registrant, the local board will be required to notify the employer on Notice to Employer, Form 59 revised, whenever the registrant is classified or reclassified for selective service.

When an employer has filed an Affidavit, Form 42A, for a registrant, this form shall be considered to be written evidence of the occupational necessity of the registrant, and the employer may appeal to a Board of Appeal from any classification of the registrant by the local board, under the provision of section 627.2, Selective Service Regulations.

Full responsibility for classification as prescribed in Selective Service Regulations remains with the local board, and all classifications are subject to the usual appeal procedures.

The acceptance of the State Direc-



or and the use of the approved State Stamp informs the local board that careful consideration has been given to occupational classification requirements and the time required to replace registrants by the employer, the War Manpower Commission, and by the State Director of Selective Service. Local boards will, however, continue to give the same serious consideration to requests for deferment from plants which do not use the Manning Table Plan, as they have in the past.

It should be noted that at the time that this presentation was prepared the legislation making men 18 and 19 years old available for military service was still pending This means that some of the forms illustrated in the following pages may be subject to changes of a minor nature.

How to Prepare Manning Tables

"USUALLY a report of this kind can be prepared for a department in a short time," the War Manpower Commission says, pointing out that a department may have 307 workers but only 7 jobs. "Even a plant employing several thousand workers could be checked and the Manning Tables prepared by two qualified persons, a clerk and a typist, within a short time." Following are WMC's detailed instructions keyed to the accompanying sample Manning Table Schedules for a "John Doe" plant.

General instructions: The Manning Table consists of a cover sheet (not shown here) and Schedules A, B, and C, which are reproduced on this and succeeding pages.

Each Job Title in each department or operating unit is to be given a line number, Number 1 for the first, 2 for the second, 3 for the third, etc. There will be only one Line 1, only one Line 2, etc., for each department.

Schedules A, B, and C will be given the same page number with the identifying letter added: 1-A, 1-B, 1-C. The next group of three will be 2-A, 2-B, 2-C. This numbering will be for the entire plant or activity without regard to the particular department or unit of the plant.

War Manpower Commission
WMC Form No.

MANNING TABLE
Schedule A

Sheet 1 of 6 Sheets

Line Number	OCCUPATIONAL IDENTIFICATION DATA			Minimum Training Time (hrs.)	Present Number Employed				
	Plant Job Title	Occupational Dictionary Job Title	Dict. & Plant Code		White		Other		Total
					M	F	M	F	
	1	2	3	4	5	6	7	8	9
	PRODUCTION	LATHE DEPARTMENT							
1	FOREMAN	FOREMAN-II	5-92.768	5000	2 6	0	0	0	3
2	LATHE HAND (1ST CLASS)	ENGINE LATHE OPERATOR-I	4-78.011	2400	15 7 0	S	0	0	22
3	LATHE HAND (2ND CLASS)	ENGINE LATHE OPERATOR-II	6-78.011	600	46 20 0	S	0	0	66
4	DRILL PRESS OPERATOR	SENSITIVE-FEED DRILL PRESS OPERATOR	6-78.083	400	1 0 0	1 0 0	1 0 0	0	3

SCHEDULE A

1. Enter in Column 1 the official title by which the job is known in the plant. The Job Title listed will ordinarily be the one by which the job is best known by the workers and by management. This Job Title may or may not be different from the payroll title.

Because the same job is often known by different titles in different plants, it is necessary that each plant Job Title entered in Column 1 be described accurately. The company preparing the Manning Table may either relate its plant Job Titles to the *Dictionary of Occupational Titles* or may submit a job description for each plant Job Title. (The *Dictionary of Occupational Titles*, Part I, may be purchased from the Superintendent of Documents, Washington, D. C., for $2. In addition to the Dictionary, a supplement has been prepared but, at this time, has not been published. Copies may be borrowed for limited periods from the Local U. S. Employment Service office.)

2. If the *Dictionary of Occupational Titles* is used, the Job Titles as found in the Dictionary should be entered in Column 2. On line 4 of the sample Schedule A shown here, the plant Job Title "Drill Press Operator" converts to the *Dictionary* Job Title "Sensitive-Feed Drill Press Operator" as defined in the *Dictionary of Occupational Titles*.

3. Enter in the upper half of Column 3, the code number in the *Dictionary* which corresponds to the title in Column 2. This entry may be omitted if the plant submits a job description. The lower half of Column 3 is for use by the plant for recording the plant code which is optional.

4. Enter in Column 4 the mini-

mum training time, in hours, that it takes an inexperienced person to reach normal efficiency. Training time may be converted to hours on the basis of an 8-hour day or a 48-hour week and a 4⅓-week month. Thus, if it takes a plant one full-time month to train a qualified inexperienced worker to reach normal production, the entry made in Column 4 for this job would be 208 (48 x 4⅓).

If some special knowledge, including special educational background or skill, is necessary before a person can be placed in a job, the time required to obtain this knowledge or to develop the needed skills should be shown. In such cases continue the horizontal line of Column 3 through Column 4, showing plant training time above the line and pre-employment training time or special background required below the line.

Make the same distinction in any Job Description (see: "How to Prepare a Job Description" on page 81) adding a short description of the type of special pre-employment training required—e.g., a technical college degree or business college course.

When there is no Job Description and the USES Dictionary Title is used, supply this information by a footnote or on the back of the table itself with appropriate identification.

5–9. Enter in Column 5 the number of white male workers employed in each job; in Column 6 the number of white female workers; in Column 7, non-white male workers; and in Column 8 non-white female workers. (Note: If plant records do not reflect these data, the over-all figure may be shown in Columns 5 and 6 with 7 and 8 left blank.)

The numbers should be shown by shifts. Line 2 on the sample schedule above shows that there are 15 white males on the first shift, 7 on the second, and none on the third. Enter in Column 9 the total number of workers. If no persons of a particular group are employed on the job, one "O" rather than one for each shift is all that is required.

If no women are now employed on a job, place an "S," which indicates suitability, in Column 6 if you believe the job could be done by women. For purposes of the Manning Table, the criterion for suitability for women will be largely physical strength required to do the job. This is in line with the most recent studies of the employment of women in war work.

Jobs that do not require handling loads heavier than 35 pounds may be considered usually suitable for women. It should be kept in mind that women are probably less capable than men of doing work requiring endurance, as in sustained lifting, pushing and pulling, and frequent or continuous crawling, stooping, and kneeling.

War Manpower Commission
WMC Form No.

MANNING TABLE
Schedule B

Sheet 1 of 6 Sheets

Line Number	Percentage		Job Filled by Handicapped Workers	Job to Be Re-engineered (Job Breakdown)	ADDITIONAL FUTURE LABOR NEEDS													
					Supplied From Within Plant		RECRUITED FROM OUTSIDE PLANT											
							Monthly Requirements					Max. Needs		Min. Experience Required				
	By Dept.	By Plant			Upgraded	Transferred	Current Month	2nd Month	3rd & 4th Months	5th & 6th Months	Total 6 Months	Number	Date	Same Experience	Related Experience	Trainees	Inexperienced
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	PRODUCTION LATHE DEPARTMENT																	
1	3.1	1.3	O	O	1	O	O	O	O	O	O	O	7-43	O	O	O	O
2	22.9	9.2	O	X	8	O	O	5	3	O	8	8	7-43	1	7	O	O
3	68.8	27.5	O	O	7	O	3	15	10	O	28	49	7-43	O	O	28	O
4	3.1	1.3	X	O	O	O	1	O	O	1	2	2	7-43	O	1	1	O

SCHEDULE B

The numbers entered in the "Line Number" column of Schedule B should correspond to those entered in Schedule A.

10. In Column 10 enter the percentage to the nearest 1/10 of 1 percent of the number of workers in each occupation in relation to the total number of workers in the department. On the sample shown here there are 96 employees in the Production Lathe Department. Of these employees, 22 are lathe hands (first class), (see line 2—Schedule A). Dividing 22 by 96 we obtain 22.9 percent, which is entered in Column 10.

11. In Column 11 enter the percentage to the nearest 1/10 of 1 percent of the number of workers in each occupation in relation to the total number of workers in the plant.

12. If handicapped workers are now employed, enter an "X" in Column 12. For purposes of the Manning Table, any worker who has a physical defect which must be considered when putting him on a job is to be regarded as physically handicapped.

13. If the plant expects to re-engineer a job within the next 6 months so that persons with fewer skills and more limited knowledge can be substituted for the all-round skilled person now required, enter an "X" in Column 13. Thus, if the plant preparing the sample Manning Table expected to break down the job of Lathe Hand (first class) (Line 2)—an "X" would have been put in Column 13. More and more re-engineering of the more highly skilled jobs will become necessary as the supply of skilled workers gets smaller.

14–26. Columns 14 through 26 should indicate the number of persons

in addition to those now employed who will be needed to meet current or increased production schedules.

14. Enter in Column 14 the estimated number of persons now employed in the plant who in the next six months will be upgraded (moved to a job requiring more skill). For instance, in Line 2 of the sample Manning Table, the plant expects to upgrade 8 workers to the job of Lathe Hand (first class).

15. Enter in Column 15 the estimated number of persons now employed in the plant who, in the next six months, will be transferred (moved to a job of about equal skill).

In addition to the number of workers that will be upgraded or transferred to utilize more effectively those now employed, certain workers will have to be recruited from outside the plant during specified periods to meet current or increased production schedules, to replace workers who have been upgraded or transferred, to replace workers entering military service, and to take care of the normal turnover.

16–20. Enter in Column 16 the number of workers that are needed or will be needed before the end of the current month in which the Manning Table is submitted. Enter in Column 17 the estimated number of workers that will have to be recruited from outside the plant during the second month, i.e., the next month following the month in which the Manning Table is submitted. Enter in Column 18, the number of workers who will have to be recruited from outside the plant during the third and fourth months, and in Column 19 the number to be recruited from outside the plant during the fifth and sixth months. The sum of the entries in Columns 16, 17, 18, and 19 should be shown in Column 20.

21. Enter in Column 21 the total estimated maximum number of workers, in addition to those now employed, that will be required to reach the peak of production. On Line 3 of the attached sample we find that it is estimated that a total of 49 additional Lathe Hands (second class) will be required. The 28 shown in Column 20 is included in the 49.

22. Enter in Column 22 the estimated month and year in which peak employment will be reached.

23–26. Entries in Columns 23 through 26 should indicate the minimum experience that is acceptable. The entries indicate the number of workers and the totals for Columns 23, 24, 25, and 26 should equal the number shown in Column 20. Enter in Column 23 the number of persons to be recruited from outside the plant during the coming 6 months who must have had experience in the same job; enter in Column 24 the number who must have had experience in some related job; enter in Column 25 the number of persons who would be acceptable providing they had had an approved vocational training course; and enter in Column 26 the number of untrained, inexperienced persons who would be acceptable.

MANNING TABLE
Schedule C
SELECTIVE SERVICE DATA

War Manpower Commission
WMC Form No.

Sheet 1 of 6 Sheets

Line Number	Under 20			20 Through 26			27 Through 32			33 Through 38			39 Through 44			45 and Over			Total Males
	Single	Married	Married & Dependents	Single	Married	Married & Dependents	Single	Married	Married & Dependents	Single	Married	Married & Dependents	Single	Married	Married & Dependents	Single	Married	Married & Dependents	
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
		PRODUCTION					LATHE			DEPARTMENT									
1															2			1	3
2				1			1	3	3		2	4		2	5		1		22
3	3			6	5	1	4	6	8	2	6	12		3	10				66
4					1														1

Subject to minor changes in conformance with proposed military service for men 18 and 19

SCHEDULE C

Columns 27 to 44 inclusive show a distribution of the male workers now employed in the plant by certain age groups and whether or not they are single, married, or married with more than one dependent.

Enter in Column 27 the number of male employees under 20 years of age now working in the plant who are single; enter in Column 28 the number of male employees under 20 years of age now working in the plant who are married. For purposes of the Manning Table a man who is married is one who has a wife or who has one child and no dependent wife.

Enter in Column 29 the number of male employees under 20 years of age now working in the plant who are married and have more than one dependent. Thus in Line 3 of the sample shown here we see that in this plant there are 3 male employees under 20 years of age who are single. There are no male employees under 20 years of age now working in the plant as lathe hands (second class) who are married or who are married and have more than 1 dependent.

Enter in Column 45 the total number of male workers now employed in the plant. Thus in Line 3 we see that there are a total of 66 male lathe hands (second class) now employed.

How to Prepare a Job Description

WAR MANPOWER COMMISSION
JOB DESCRIPTION

(For Use in Making Manning Tables)

1. COMPANY NAME: X.Y.Z. Co., CLEVELAND, OHIO 2. Page No. 1A Line No. 5
(As on Schedule A of Manning Tables)

3. PLANT NAME: A 4. DEPARTMENT: PRODUCTION LATHE

5. JOB TITLE: BAND-SAW OPERATOR
(List first most common title used in plant and any additional titles – separate by semi-colons)

6. MINIMUM TIME NOW REQUIRED TO TRAIN A REPLACEMENT: 200 HOURS

7. SPECIAL PHYSICAL REQUIREMENTS: NONE
(State unusual requirements of job – eyesight, strength or other, and what portion of job requires this trait)

8. SUPERVISION: Receives work assignments from Foreman
(Indicate type of supervision received or given)

9. DESCRIPTION OF WORK PERFORMED:
SUMMARY (Give overall picture of job in one or two sentences) Cuts sheet metal blanks to specified dimensions using a power-driven band saw

Steps performed in the job	Percent of Time	Exactly How Performed (Include special skills, machinery, tools, judgments, decisions)
a. Marks sheet for entry, according * to specifications	13%	Lays out lines to be cut using T square, compass, triangle and chalk or scriber
b. Clamps marked sheet to work table	5%	Uses clamps to fasten workpiece to table
c. Directs lubricating fluid against cutting edge	2%	
d. Cuts blank from ** sheet	80%	Starts saw and turns handwheel or engages power-driven feed to move stock against blade of saw

Indicate most essential skill with * Indicate next most essential skill with **

10. COMMENTS: (Use this space to enter additional information explaining items on this form to give additional facts about this job; to indicate where job fits into industrial process; to explain differences between this and similar jobs; to define any special terms peculiar to the job; or any other pertinent information.)

Worker must exercise care to avoid amputating fingers

If the plant prefers to submit Job Descriptions, rather than use the *Dictionary of Occupational Titles* the sample shown above may help.

Other forms may be used. This is the basic information which any Job Description must contain regardless of the form chosen:

1. Name of company.
2. Line number, page, and department in the Manning Table to which each Job Description refers.
3. Plant Job Title or Titles if job is known by more than one title.
4. Minimum time required to train a qualified inexperienced person to reach normal production.
5. Unusual physical requirements.
6. The type of supervision given or received.
7. A description of exactly what is done on the job under consideration, including the purpose of the job and listing the machines, tools, special skills, knowledge, and judgment used or required. See Schedule A instructions, third paragraph of Item 4.
8. The percentage of total time spent in performing each of the major tasks which comprise the job.

(*Continued on next page*)

How Washington Looks at the Plan

HERE IS THE PHILOSOPHY back of the Manning Table Plan as summarized in a joint statement by Paul V. McNutt, Chairman of the War Manpower Commission, and Maj. Gen. Lewis B. Hershey, Director of the Selective Service System:

"In a total war, each person in the Nation should do as nearly as possible the thing for which he is best equipped. The War Manpower Commission and the Selective Service System recognize this principle and propose to leave in industry the irreplaceable worker and to allow time to procure and train replacements for those taken into the armed forces."

In one test plant employing 11,000 workers, it was found that there were 3100 riveters, whose replacement training time ran from 3 to 6 weeks and 45 percent of whom were subject to military call. Such short training periods would scarcely entitle them to deferment. Yet any haphazard withdrawal of these workers would clearly impair production.

To see the need for an immediate, practical answer to such a problem one need not await the much-debated drastic, general governmental control of the labor market which subsequent manpower shortages may—or may not—necessitate.

Its governmental sponsors believe, therefore, that the Manning Table Plan, experimental and voluntary as it is, will definitely assist industry now and in the future. They point out that early allocations and inventories in the field of raw materials might have spared industry much of the confusion which later developed.

Chiefly concerned in development of the Manning Table Plan are: Brig. Gen. Frank J. McSherry, Chief of Operations, WMC; Brig. Gen. William C. Rose, Chief, Military Division, WMC; C. R. Dooley and Walter Dietz of Training-Within-Industry and W. F. Patterson and Ansel R. Cleary, of the Apprentice-Training Service, all of WMC's Training Division; Dr. C. L. Shartle and Julian W. Baer, Occupational Analysis Section, United States Employment Service; Col. Lewis Sanders, Major Robert B. Coons, and Maj. Bayard S. Shumate, of the Selective Service System; Charles V. Kidd, Planning Service, WMC; Dr. Frank H. Sparks, Consultant on Industrial Deferment, WMC; and the following members of industrial concerns: Russell J. Greenly, Carnegie-Illinois Steel Corporation; and Henry J. Roesch, Briggs Manufacturing Company

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HOW THE MANPOWER PICTURE WILL CHANGE

	UNEMPLOYED	SELF-EMPLOYED	AGRICULTURE	NON-WAR WORKERS	ARMED FORCES	WAR WORKERS
DEC. 1940 TOTAL LABOR FORCE 54,600,000	7,400,000	6,000,000	8,600,000	30,000,000	900,000	1,700,000
DEC. 1941 TOTAL LABOR FORCE 55,400,000	3,800,000	5,300,000	8,200,000	29,100,000	2,100,000	6,900,000
DEC 1942 TOTAL LABOR FORCE 58,700,000	2,400,000	5,000,000	7,800,000	20,500,000	5,500,000	17,500,000
DEC. 1943 TOTAL LABOR FORCE 62,300,000	2,000,000	4,700,000	7,500,000	19,100,000	9,000,000	20,000,000

Prepared for FACTORY *by Visualfacts, N.Y.*

Canada's Manpower Control

No LONGER can Canadian employers hire and fire at a moment's notice. Canada has frozen all industrial workers in their jobs, has put into operation machinery which enables government employment offices throughout the Dominion to keep an accurate pulse on the labor situation.

Again leading the way in economic war controls in the Western Hemisphere, Canada has now inaugurated strict control of all workers on all jobs. Faced with a growing manpower shortage, Canada acted quickly. On August 19 Prime Minister Mackenzie King announced the long-expected National Selective Service Plan as it applied to labor in a nation-wide radio broadcast. On September 1 the plan went into operation.

Everyone Must Help

"Compulsory service — in other words, conscription—for the whole of Canada, over the whole of Canada, has been a part of the law of the land since 1940," Prime Minister King told his fellow-Canadians. "This has been frequently forgotten. . . . The government's policy is that every man and woman capable of performing some form of war service should undertake the service for which he or she may be best qualified and which the demands of war require. This policy will necessarily immediately affect all but the very old, the very young, and the disabled among us."

Labor Minister Humphrey Mitchell told Canadians that the new regulations are aimed to provide "the largest armed forces possible, the optimum of war production, the minimum of civilian services, and the minimum of agricultural production in keeping with the needs of Canada and Britain."

The regulations affect practically all Canadians except women domestic servants in homes where there is not more than one servant employed; provincial government employees; ministers, priests, or clergymen; casual labor; persons in part-time subsidiary employment which is not a regular occupation; farmers, hunters, trappers, and fishermen; teachers, nurses, and probationers; students working after school or on holidays other than long summer vacations; and professional engineers or science workers who come under the Wartime Bureau of Technical Personnel.

Women in Canadian munitions plant place cordite in silk bags

Washington hints repeatedly that conscription of labor may be essential to the war production effort. Canada has already found it so. The Dominion's National Selective Service Plan has been in effect only since September 1, so it is too early to assess results. It is not too early, however, for us to examine the Canadian plan as the possible pattern for a move of our own in the direction of complete control of manpower

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Other Canadians may not quit their jobs or be discharged or laid off without seven days' written notice by either employee or employer. No employer may interview or hire any worker unless the latter has a permit from the national selective service officer in his locality to seek employment. Even the advertising for help or for positions, other than those in the excepted list, must be approved by the National Selective Service Board, and applicants and employers must answer advertisements through the local offices of the board.

Records of employees leaving their jobs are immediately available at the local government offices, and the selective service officer has an accurate picture of the labor needs and labor supply in his region.

In addition to these regulations for employers and employees the national selective service officer can order any person for an interview at the local office, can order any person who has been unemployed seven days to take any suitable work, and can order any partially employed person to take any suitable full-time work. While volun-

tary cooperation will be tried in every case, the officer has the power to compel persons to take suitable jobs. No person ordered to a job by a national selective service officer may quit that job without permission of the officer.

The regulations also take into account the placing of men or women in jobs distant from their homes and at salaries below those they have been receiving in non-essential industries. Thus the board may pay transportation and certain other allowances when placing a worker at a distant job. If the pay is considerably below that of the person's former job, the board may supplement that pay up to $5 weekly. Workers moved from less essential industries to essential work may claim reinstatement in their former jobs when the more essential work is finished.

Agricultural workers may take seasonal or temporary employment outside agriculture with the consent of the local selective service officer when such work will not interfere with farm production.

Canada has frozen wages and salaries, and made illegal the pirating of war workers from one plant to another with the lure of better pay or better working conditions. All advertising for help states that employees engaged in war work need not apply.

Wages were frozen when Canada established price ceilings in December, 1941. At three-month intervals, the cost-of-living figures of the Dominion Bureau of Statistics act as the basis on which employers must pay a cost-of-living bonus to practically all employees, the bonus being set at 1 percent of salary for each point of rise in the index for those earning over $25 per week, and slightly higher for those earning less. Wage increases may be paid under certain conditions—for example, to bring them closer to wages paid for similar work in similar industries elsewhere in Canada, or for promotion and increased responsibilities.

New Manpower Boards

The National Selective Service Board will work closely with the National Defence Department in drafting men for the Canadian Army. New boards are being set up to review military deferments and supply men for war industries. Pre-classification of men as to their essentiality in their present jobs and a pre-medical classification are to be carried out by the new manpower boards under the National Selective Service Board. Existing classifications and deferments for military service are to be reviewed.

At present, single men and widowers without children, between 20 and 40 years of age, are subject to draft call. There will, however, be no obstacles placed in the way of men or women joining the army, navy, or air force on a voluntary basis.

A new wage-control order is expected soon to insure equal pay for equal work, and so bring pay envelopes of experienced women workers in line with those of similarly experienced men workers. Basic wage rates are to be paid with respect to occupational classification.

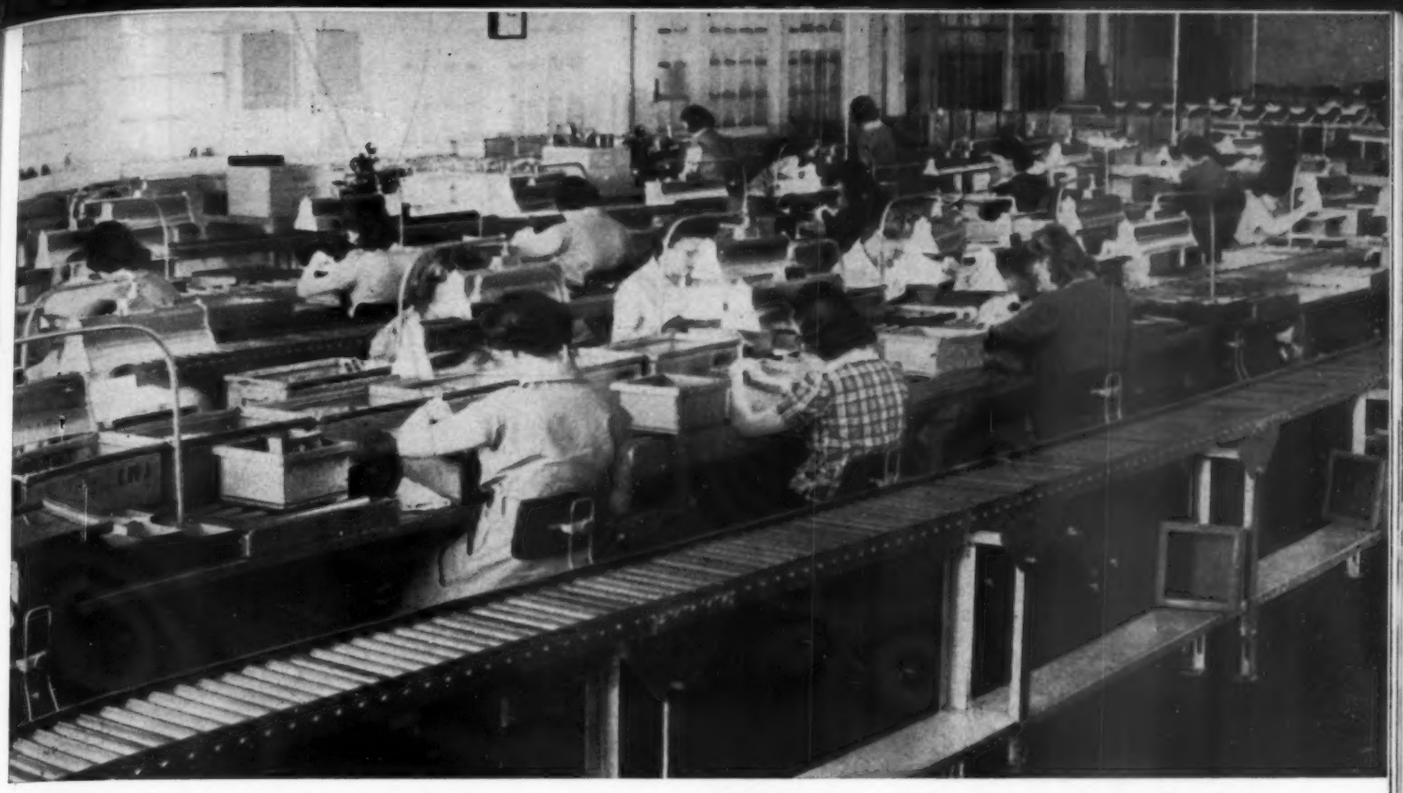
Industry throughout Canada is being classified into four groups for purposes of labor priorities. Those in group *A* will have absolute priority for assignment and employment of men and women as needed. In the *A* group are firms directly engaged in war work and those producing goods or rendering services considered vital to wartime civilian needs and morale.

The *B* group includes firms indirectly on important war work but not supplying essential civilian wartime needs or services.

In the *C* category are firms whose

(*Continued on page 196*)

In Canada wages are frozen; it is illegal to try to hire workers from another plant by promises of better pay. With certain exceptions, employees cannot quit or be fired without seven days' notice



Hard to beat this combination of new layout, conveyorized handling, fluorescent lighting, and air conditioning. It enabled the same group of girls to make startling gains in production

How We Doubled the Output of Our Inspectors

D. W. SAXTON, Superintendent, Hoover Ball & Bearing Company, Ann Arbor, Mich.

ONE GROUP OF GIRLS increased its output in our ball inspection department from 70 to 100 percent when changes were made in layout, methods of materials handling, lighting, and temperature control. The difference in percentage of output gained was due to the weight of balls being inspected —the heavier the balls, the greater the percentage of increase in output.

It should be stated at once the inspectors are not working harder. In fact, the work is now less difficult, because lifting from floor to bench and walking with load from one work position to another have been eliminated—there is more "do" and less "get ready" and "put away." Costs of the installation, exclusive of the building changes, were covered by savings in about four months.

Ball inspection, as such, is done in few plants, but the elimination of weight-lifting by the use of roller conveyors to handle work at waist level and the conditioning of air supplied to workers are universal factors in improving the method and increasing the ease of productive effort. These were the moves that resulted in our increase in output. However, some characteristics of ball inspection must be mentioned in order to clarify the layout changes.

Ball sizes in our plant run from $\frac{1}{8}$ to $4\frac{1}{2}$ inches, in steps of $\frac{1}{32}$ inch. Although many materials are used in the product, only chrome balls are inspected in the department under discussion. Inspectors are paid on a piecework basis which requires that 30 percent of the balls be reinspected. First inspection is 100 percent; reinspectors, who are paid day rates, inspect 30 percent of the work of each first inspector.

Less Walking, Lifting

Several changes were made in the department. The most important, undoubtedly, was the reduction in the number of times inspectors had to pick material up from the floor, and in the lessened amount of walking with each totepan of balls. Altogether handlings of each pan were reduced from 14 to 8, and the number of feet walked with each pan from 300 to 12 for the first inspectors. Reinspectors had walked approximately the same distance. In the new layout this distance also was reduced in the same proportion. The previous moving about caused mixing of sizes, which later had to be separated. Also time was lost by inspectors waiting for the supervisor to give them assignments.

Figure 1 shows the old layout. Pans of balls were delivered from the final process department and placed on the floor in the center of the room. Assigned to inspect a pan of balls of a certain size, the inspector stooped to the floor, secured a quantity for convenient handling from the pan, and carried them to the weigh-and-cleaning bench. When this operation was completed, the balls were taken to the individual workcenters along the bench on the north and west walls

of the department. Frequently two girls got together to move the pan, instead of one girl making two or more trips in order to handle all the balls in one pan. After inspection at the individual workcenter, the first inspectors carried their boxes of balls to the reinspector's bench, and returned to the center of the room to repeat the cycle of stooping, lifting, walking. The reinspectors carried the balls from their positions to a bench placed behind the automatic gages.

Figure 2 is a diagrammatic sketch of the new layout and materials handling system. Two basic differences are seen between this and the old layout: First, the pile of totepans in the center of the room has disappeared; second, walking has been reduced to the 3 feet between the inspectors' bench and the roller conveyor to the reinspectors.

Ride the Conveyors

In Figure 2, the totepans move into an air-conditioned room at *A* from the cleaning bench just outside. Then they travel along the wall, past the master size-check bench, and around the end of the room. At the end of the room, pans are transferred from this conveyor at *B* and *C* to the two roller conveyors that run down the centers of the two inspection lines. Swinging sections of conveyor at *B*, *C*, *D*, *E*, and *F* permit an aisleway at each end of the room. Each inspection line is constructed in three sections. In the center is the 12-in. roller conveyor containing the totepans of balls to be inspected; on each side of this conveyor is an 18-in. metal table continuous with the roller conveyor throughout its length; at each inspection position, a roller section is welded to the table at the inspector's left, permitting the inspector to pull a pan of balls from the central conveyor to this section.

The actual act of inspection remains the same. The inspector scoops balls from the totepan at her left to a ground-glass plate immediately in front of her. Under this plate is a wooden box into which the inspected balls are dumped. When this box is full, the inspector picks it up and turns around to the roller conveyor leading to the reinspect bench 3 feet behind her.

All material is kept on roller conveyors at waist level. Moreover, the material is moved to the inspectors—they do not have to be assigned to it nor do they have to hunt for it. Walking is reduced to the 3 feet between the workcenter and the conveyor to reinspect bench.

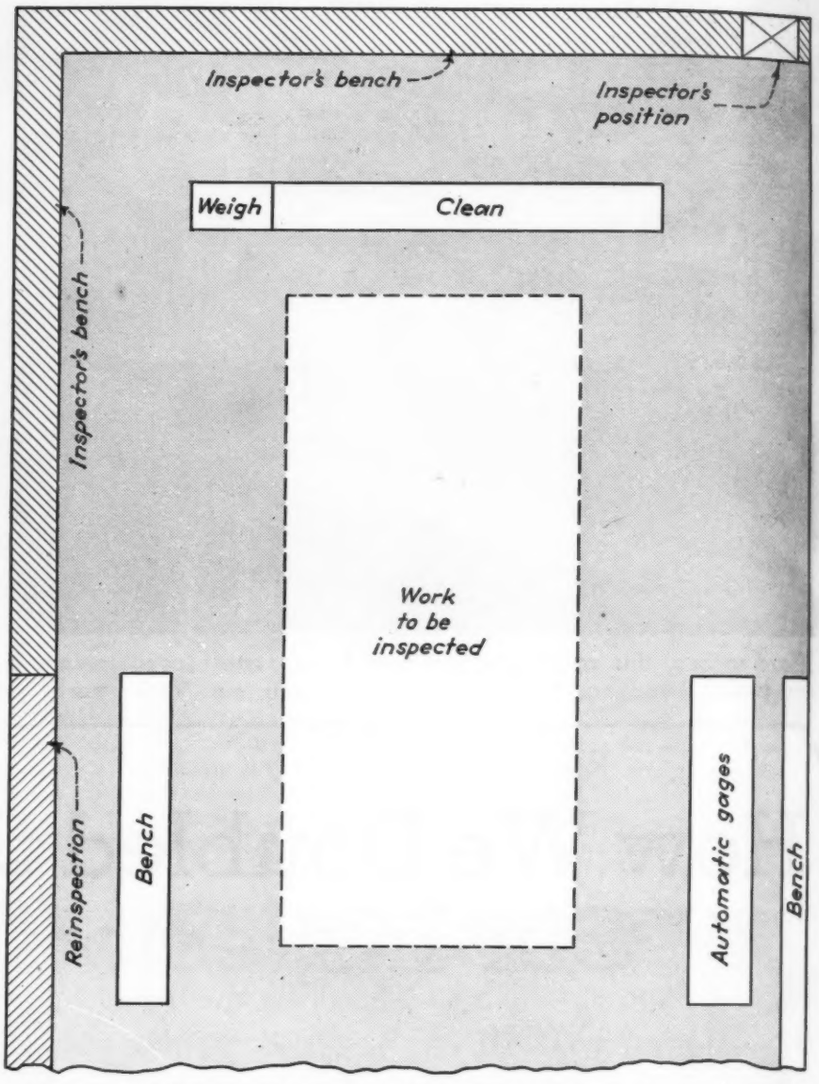


Figure 1. Old layout. Pans of balls were placed on the floor in the center of the room. From there they were carried by inspectors to weigh-and-clean bench, to workcenter, to reinspection bench

In principle, the handling of materials at the reinspect bench is the same as that described for first inspectors. Boxes on the roller lines at *D*, *E*, and *F* are moved to a roller line immediately in front of, and integral with, the reinspection bench. Boxes from this line are pulled off to individual workcenters and the 30 percent is inspection made. The reinspectors move the inspected balls to the roller conveyor behind them. Material then goes to the hand size gages by roller conveyor or to the gravity gages. Final operations are counting, oiling, packing, and transfer to shipping at *G*.

Undoubtedly, most of the increase in output is the result of the conveyorized method of materials handling, but not all. It has been mentioned that in the old layout considerable time was lost by inspectors waiting to be assigned jobs by the supervisor. With 35 inspectors, and with the variety of sizes of balls in operation at one time, this was no small task. To reduce the effort and the lost time, there was a natural tendency to assign inspectors continuously to balls of a certain size. This led to inflexibility in the force of inspectors, and a disinclination on their part to inspect any size to which they were not thoroughly accustomed.

This procedure has been completely reversed with the new layout. Totepans of balls move down the roller conveyor in the center of the inspection tables and the inspectors select the most convenient box regardless of size. To be sure, some training, or perhaps retraining, was necessary. But now the problem of job assignment

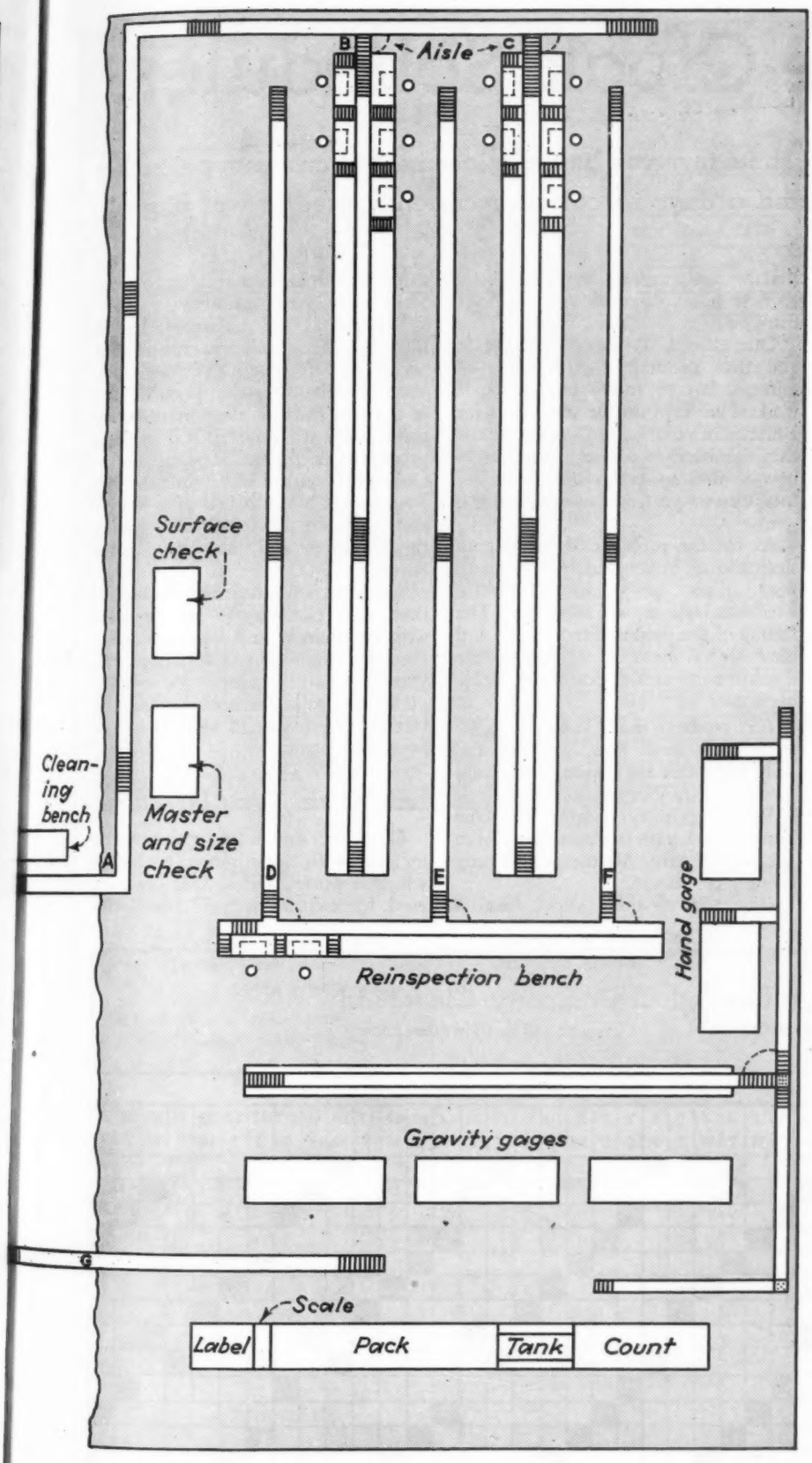


Figure 2. Totepans move into room at *A*, travel along wall on roller conveyors past size-check bench. Are transferred at *B* and *C* to conveyors that run down the centers of the two inspection lines. Conveyors are waist high to eliminate lifting and there is almost no walking

has disappeared, and with it the time lost in waiting.

A new set of chairs was purchased for this set-up. The back of the chair provides support for the inspector and is adjustable to suit individual preference. Height of the seat above the floor is adjustable also. This tailored-to-suit chair has eliminated the complaints of backaches that were frequent with the old straight-back stools, and, although objective results in savings cannot be stated, we are convinced that it was a wise investment in worker comfort.

New Lighting Helped

Equally important, perhaps, was the change in lighting. In the old layout, inspectors faced west and north at their individual workcenters. They were provided with 12-ft. single-tube fluorescent local lights. Variations in natural light resulted in a variation of usable light on the inspection plates from hour to hour and from day to day. In the new layout the amount of natural light is not important, because the inspection department is built in a court between two fabricating buildings. Instead, two-tube daylight fluorescent units on 14-ft. centers are provided for general light, and at each inspection center there is 12-in. single-tube daylight fluorescent light which is adjustable in height to meet the needs of each inspector. This light can be rotated 315 degrees to accommodate shifting material. Light cords are brought in through the floor and strung under the inspection tables—no drop cords are visible in the room.

In the new layout an item of considerable importance is the floor, an asphaltum composition in place of concrete. Formerly material dropped on the floor was a total loss because of scratches and grit ground into surfaces. The new floor material permits the recovery of dropped balls undamaged—and accounts for approximately a 3 percent saving in finished material.

In the old set-up, heat and humidity in summer were frequently incorrect for best working conditions. In the new department, air conditioning is provided, and the temperature is kept within 12 to 15 degrees of the outside temperature. Relative humidity also is under control. Water at 56 degrees is run through coils. Air is forced through the coils and delivered to the 100x50-ft. inspection room through four equally spaced outlets. A considerable portion of the increased production must be ascribed to improvement in working conditions brought about by this control of temperature and humidity.

Round-the-Clock Schedules

New proposal for timing shifts involves little displacement of customary sleeping hours—plus a schedule and a days-off calendar currently used in war plants*

TO AVOID COMPLETE DISRUPTION of the home and social lives of workers who must otherwise work nights, industry has long adhered to the fair practice of rotating shifts. The trouble with most rotation plans, however, is that they leave no chance for the human body to accustom itself to frequently changing periods of rest and activity.

Consideration of this fact has led Dr. Nathaniel Kleitman, Associate Professor of Physiology at the University of Chicago, to propose what bid fair to become generally known as the "red, white, and blue" shifts.

Red, White, and Blue

It takes weeks, Doctor Kleitman points out, for the worker to establish a new 24-hour sleep-work-meals-leisure cycle. Yet the shift schedule that rotates weekly, or oftener, presupposes that he can accustom himself *at once* to new hours of work and sleep. It can't be done.

One answer, obviously, is to rotate and thus maintain the principle of fairness, but to rotate less often. If workers are kept on the same shift for a matter of months, not weeks or days, they are asked to adjust themselves to new work-sleep cycles only three or four times a year, not once or twice a week.

As for the problem of learning to sleep during hours usually devoted to work or play, proper timing, Doctor Kleitman believes, will solve that. The timing of the proposed red, white, and blue shifts involves relatively little displacement of the customary sleeping hours:

Red (sunset) shift. Working hours from noon to 8 p.m. Evening and early night free for leisure. Sleep from 1 or 2 a.m. to 9 or 10 a.m.

White (victory) shift. Working hours from 8 p.m. to 4 a.m. Sleep from 5 a.m. to 1 p.m. Afternoon and early evening for leisure.

Blue (dawn) shift. Work from 4 a.m. to noon. Leisure in the afternoon. Sleep from 7 p.m. to 3 a.m.

No one, it will be noted, has to sleep in the afternoon, when most people find sleeping impossible. Note, also, that when a worker is on the *red* or the *blue* shift his sleep immediately precedes his work, just as it does when people work normal daytime hours. Only when on the *white* shift does he have to tumble into bed *after* work—and he makes up for that by having the afternoon and early evening for leisure.

A further advantage lies in the fact that shift changes do not coincide with community rush hours—which is especially important if local bus and streetcar companies are to be counted on to help solve the acute problem of transporting industrial workers to and from their plants.

American Type Founders

Complete details of operation are included with this triple-shift schedule which is worked out so that the work week for men averages 53 hours with

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* For other 1942 shift schedules published in FACTORY, see March, page 73; April, page 49; May, page 72; August, page 82.

The Ohio Crankshaft Company, Cleveland

Calendar marking days off — 7-week cycle (5 weeks shown)

NAME	OCTOBER														NOVEMBER																									
	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F
John Doe	■													■						■						■						■			
James Block		■						■												■							■					■			
Henry Brown			■						■						■							■					■						■		
Wm. Green				■						■						■						■							■						■
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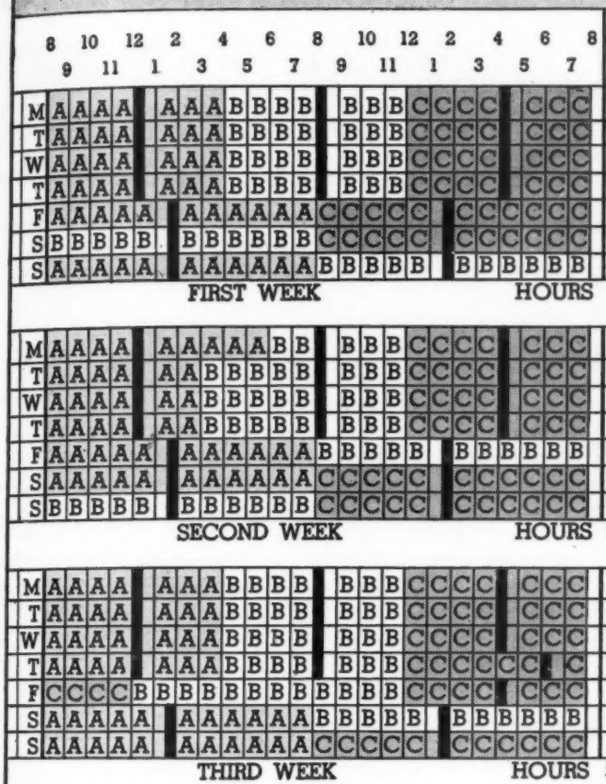
American Type Founders, Inc., Elizabeth, N. J.

Continuous operation — 3 crews — 53-hour week (ave.)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9 11 1 3 5 7 9 11 1 3 5 7
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T A A A A A A A B B B B B B B C C C C C C C
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T A A A A A A A B B B B B B B C C C C C C C
F A A A A A A A A A A A A A A C C C C C C C
S B B B B B B B B B B B B B B C C C C C C C
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	SHIFT "A"			SHIFT "B"			SHIFT "C"		
	Hrs. On	Hrs. Off	Hrs. Pay	Hrs. On	Hrs. Off	Hrs. Pay	Hrs. On	Hrs. Off	Hrs. Pay
FIRST WEEK									
M	7½	16	7.5	7½	16	7.5	7½	16	7.5
T	7½	16	7.5	7½	16	7.5	7½	16	7.5
W	7½	16	7.5	7½	16	7.5	7½	16	7.5
T	7½	16	7.5	7½	32	7.5	7½	12	7.5
F	11½*	36	13.3	0			11½*	12	13.3
S	0			11½*	24	17.3	11½*	40	17.2
S	11½*	12	17.2	11½*	10	17.2	0		
HOURS	53	112	60.5	53	114	64.5	53	112	60.5
SECOND WEEK									
M	9½	14	10.3	5½	15	5.5	7½	16	7.5
T	6½	17	6.5	8½	15	8.8	7½	16	7.5
W	6½	17	6.5	8½	15	8.7	7½	16	7.5
T	6½	17	6.5	8½	20	8.8	7½	36	7.5
F	11½*	12	13.2	11½*	24	13.2	0		
S	11½*	36	17.3	0			11½*	12	17.3
S	0			11½*	20	17.3	11½*	16	17.2
HOURS	52	113	60.3	54	109	62.3	53	112	64.5
THIRD WEEK									
M	7½	16	7.5	7½	16	7.5	7½	16	7.5
T	7½	16	7.5	7½	16	7.5	7½	16	7.5
W	7½	16	7.5	7½	16	7.5	7½	16	7.5
T	7½	40	7.5	7½	12	7.5	11½*	12	13.3
F	0			11½*	20	13.3	7½	36	7.5
S	11½*	12	17.3	11½*	32	17.2	0		
S	11½*	12	17.3	0			11½*	16	17.2
HOURS	53	112	64.5	53	112	60.5	53	112	60.5

Solid Black ▮ = ½ hr. Lunch Period

*Women work 10 hours only

3 Week Cycle	Days Off Fri.	Sat.	Sun.
1st Week	B	A	C
2nd Week	C	B	A
3rd Week	A	C	B

Average for Three Weeks MEN	WORK	PAY
"A"	52.7	61.8
"B"	53.3	62.4
"C"	53.0	61.8
Average	53.0	62.0

Average for Three Weeks WOMEN	WORK	PAY
"A"	49.7	57.3
"B"	50.3	57.9
"C"	50.0	57.3
Average	50.0	57.5

62 hours' pay; for women, 50 hours at 57.5 hours' pay. Each male employee works 11½ hours on two days of each week, but on those long shifts women work 10 hours only.

Days off are confined to Fridays, Saturdays, and Sundays. Each employee works six days, has one day off each week, a Sunday off every three weeks.

Ohio Crankshaft

An "alternating swing shift" that requires 28 men for every 24 jobs has resulted in a 75 percent reduction in week-end absenteeism at this company, officials say. Production has increased. The trend of rejections is sharply downward. The new shifts affect all but shop salaried employees who in turn stagger one day off every other week.

Formerly on a full 7-day schedule, workers in the aviation division now have one full day of rest a week. A calendar of days off is provided. It extends through a cycle of seven weeks and then repeats. Thus every shop man knows in advance his day off, which occurs on a different day each week. A chart that looks much like a crossword puzzle blank reveals the full cycle and the day off for each man within a given group.

Weeks commence on Saturdays. A black square indicates days off. A Saturday off is followed next week by a Friday, the following week by a Thursday, and so on.

The four extra men in each 28 are operators familiar with all machines in their groups. They go from operation to operation during the cycle, filling the spots left by the men who are away.

Prior to introduction of this plan, which was devised by G. P. Adams, general foreman on the night shift, total man-hours lost because of week-end absenteeism ran as high as 768 hours on one Saturday and Sunday. Layoffs resulted from genuine fatigue in some cases, from family pressure in others.

Each of the three 8-hour shifts is set up on the foregoing basis.

THE AMERICAN THEATRE WING PRESENTS

The Lunch-Hour Follies

A non-profit institution offers war plants a swiftly paced, expertly routined lunchtime show at nominal cost

THE SCENE is a shipyard. The noon whistle sounds. At the signal shipfitters, calkers, riggers, carpenters, engineers, and ordinary laborers stream to the main gate where, in a large open space, a platform has been erected on which is perched a small upright piano.

Men gather about the platform. Some are lucky enough to get chairs. Others climb on nearby sheds and roofs, on trucks and autos, wherever sight lines to the stage seem promising. Men gather until in a few moments thousands, lunchboxes open, are eating sandwiches and sipping pop and milk, waiting for the entertainment to start, the show to go on.

"Lift" for Weary Workers

And now the show is on. Into the limited meal recess another "Lunch Hour Follies" is crowding songs and sketches, the gentle ribbing of a facile master of ceremonies, the precision taps of expert and pretty dancers. The men munch their sandwiches, and laugh and applaud. The whistle blows again and they are off to work, but this time with a certain easy jauntiness indicating a real lift to their spirits and their energies.

And the Lunch Hour Follies moves on to another plant.

One day it is a shipyard, perhaps Todd or Wheeler. Another day the Follies goes on before thousands of radio workers at the RCA plant in Camden or Harrison, or before thousands of toolmakers at Gould & Eberhardt in Irvington, N. J., or at Sperry Gyroscope in Brooklyn, or at the ultramodern new plant at Lake Success on Long Island. At one plant the Follies may perform at noon, at another at 4 p.m., at still another at midnight, and at still others at 3 a.m.—whenever the mealtime falls. Some shows run 15 minutes, others 20, 30, or 40. Whatever the mealtime allowed and whenever it takes place, whether there be 500 workers or 5000, whether they be men or women or mixed shifts, the Follies is there with a swiftly paced, expertly routined show staffed by professional Broadway actors and singers and dancers performing with the easy, relaxed, and sure technique that is the mark of the professional entertainer.

This new program service designed to furnish entertainment to workers in industrial plants producing war material is making a vital and significant contribution to the country's battle for production. Men and management have given it a four-star rating, and there is an increasing interest in the origins and future of such program service.

Today it is generally agreed that the destiny of the United Nations will depend as surely upon the morale of the man in overalls as upon the man in uniform. Fatigue and boredom born of labor are as dangerous as any secret weapon the enemy might employ. Early in the war our British allies found that men do more work and better work when they've had a "lift"—something to send them back to their machines with their spirits refreshed and their enthusiasms rekindled.

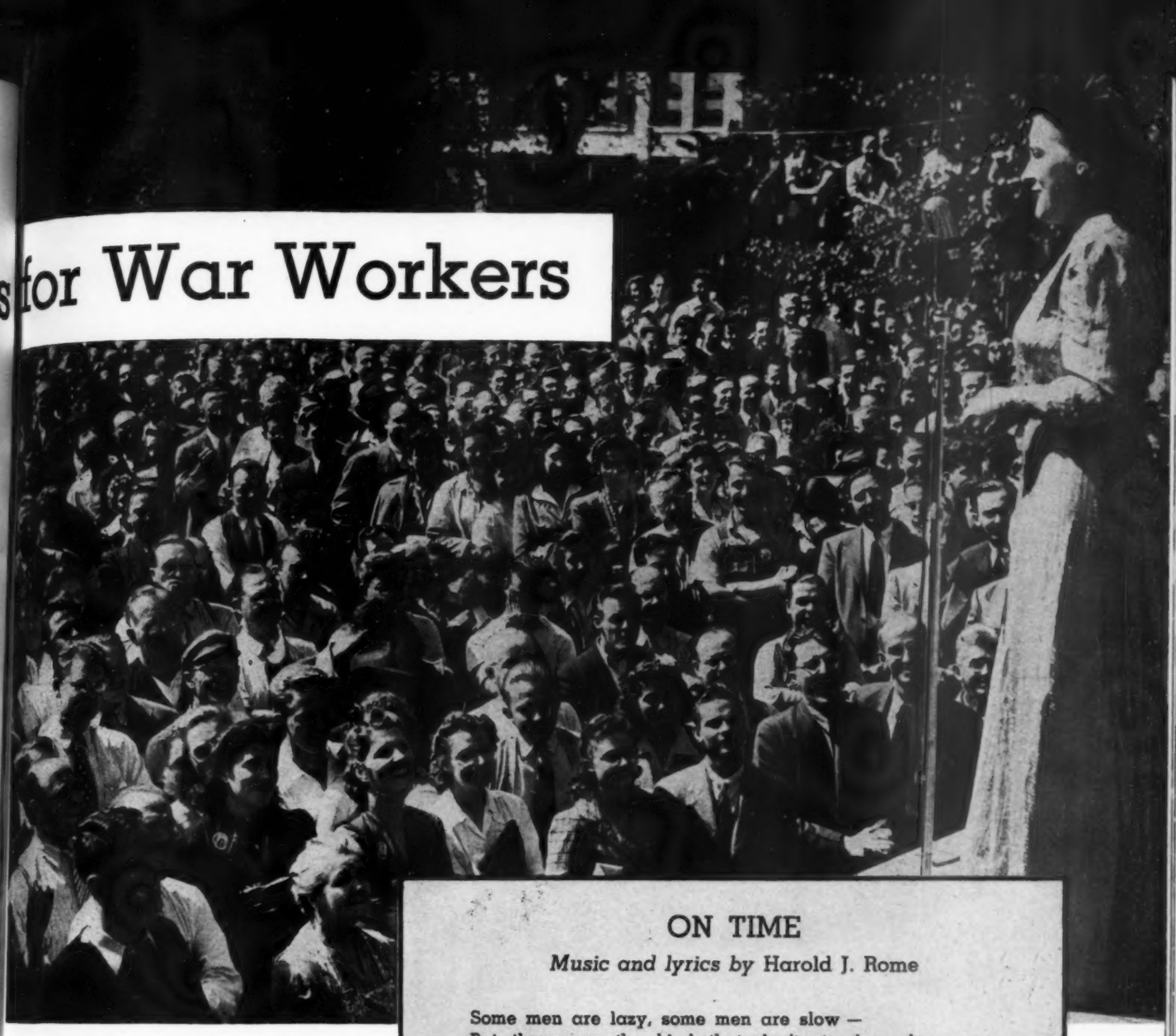
Photo by Philadelphia Inquirer

Judging from the expressions on their faces, these men are getting the kind of lift they need to finish their day's work

Successful in Britain

Working up to 70 hours each week without hope of a holiday, British workers found places of entertainment closed when they left their long shifts at the factories. In July, 1940, the Ministry of Labour decided that entertainment should be provided in the factories, and for this purpose the work of England's Entertainment National Service Association was extended. During the first year of that service, England presented an average of 850 entertainments per week for her factory workers alone. And toward the close of 1941 it was reported in the House of Commons that 45,000 entertainments had been provided at some five or six thousand factories and engineering sites in Great Britain.

lies for War Workers



Shows not only entertain but also deal with specific problems like absenteeism, tardiness, and safety. Above, a Broadway performer entertains an audience at Wheeler Brothers Shipyard in Brooklyn. Right, a song aimed at those who get to work late

Today no one in England questions the need for this entertainment service in maintaining morale at fighting pitch. The British Ministry of Health, in a report of its Medical Research Council, found that under a proper program of recreation the increase in factory output ranged from 6.2 to 11.3 percent over a measured period. A warehouse reported in one month an increase of work between 10 and 15 percent.

In England's effective program to increase production by bettering the morale of workers can be found the origins of the American Theatre Wing's Lunch Hour Follies. Some

(*Continued on page 198*)

ON TIME

Music and lyrics by Harold J. Rome

Some men are lazy, some men are slow —
But those are the kind that don't stand a show.
'Cause I want a man who comes to work on time
Oh, give me a man who's in there working right on time

If I had a guy who kept coming late
I'm telling you I would give him the gate.
'Cause I want a man, etc.

Those absentee boys, now I think are mean
They'd never get working on my machine
Cause I want a man, etc.

To handle my goods and tighten my slack
Now I got no use for a stayaway Jack
'Cause I want a man, etc.

The guy who lays down and doesn't work hard
Will never get employment in my shipping yard
'Cause I want a man, etc.

The man who stays home and lets his pals down
Won't get in my plant to turn my wheels around
'Cause I want a man, etc.

I can see by your smile — I can see by your style
That all you boys have something that I'd find worth while
'Cause I want a man who comes to work on time
Oh, give me a man who's in there working right on time

COMBATING NEEDLESS A

CHARLES B. COATES
Associate Editor, *Factory*

Why War Workers Go AWOL

1 **Lack of interest on the worker's part in a particular job, and failure to connect the job with the war effort (in turn reflecting somebody's failure to show the worker how his absence may harm the war effort)**

2 **Increased earnings through overtime and higher wage scales, enabling the worker to "lay off" without decreasing his living standards**

3 **The temptation to spend money on entertainment and recreation as consumer goods become scarcer and scarcer**

Three Ways to Attack Absenteeism

1 **Set up definite safety and health programs in industrial plants**

2 **Create more attractive working conditions, especially for women and older workers**

3 **Use the "psychological approach" via posters, employee magazine editorials, bulletin board announcements, attendance contests, rallies, and all the other visual and auditory appeals in the promotion man's kit of tools**

WHEN THE ALARM CLOCK RINGS, Joe Doakes, industrial war worker, is far too likely nowadays to roll over and forget about work for the day.

The current name for Joe's failure to show up at the plant is "absenteeism." The war has broadened the meaning of the term to include absence as an act of volition on the part of Joe Doakes. A minor problem in peacetime, this is now a serious evil.

Joe's truancy, as Joe views it, seems a minor transgression. To him it means merely a day's pay lost and a few hours' sleep gained—a chance to go hunting or paint the garage.

To the nation, however, it means at least 6,000,000 man-days lost to the war effort per month, according to a conservative WPB estimate.

"Absenteeism," said Paul Porter, shipbuilding stabilization chairman of WPB recently, "is costing us two cargo ships a week."

That's the story in shipbuilding alone. Meanwhile a labor-management committee in Butte, Mont., made a study and found that absenteeism had clipped 8.5 percent from the possible total of man-hours that could have been worked in a single month in a single copper mine.

"In round figures," said the committee, "this means absenteeism cost us 63,000 pounds of copper a day."

At that very time, a statistician in Washington who deals in even bigger and rounder figures was pounding the table and declaring:

"Every ounce of copper we lose today for *any* reason is a cartridge snatched from some boy's belt!"

The copper-mine example, as it happens, offers a pretty clear definition of present-day absenteeism. "Absence due to personal reasons" is another way in which it is often described. It is comparable to what the Army calls "absence without leave." "Playing hookey" might be an even better term.

At all events present-day absentee-

ABSENTEEISM

ism should not be confused with absence due to illness or accident, which is also increasing rapidly under the stress of war. The latter normally costs us eight man-days per worker a year. It will take all the efforts of all the forces concerned with plant health and safety work to keep this figure within bounds as millions of inexperienced workers embark on unfamiliar tasks throughout industry.

Observers do have difficulty, however, in drawing the line between illness and plain truancy. Exact statistical information on this point is lacking, for it is hard to classify such things as simple headaches. A headache may well be a justifiable cause of absence, yet a large element of truancy may lurk in the cause of the headache itself.

In Superior, Ariz., for example, the bars were recently closed on Sunday. One copper mine immediately reported a 61 percent decrease in Monday morning absenteeism. When the experiment was repeated in neighboring towns, the results were equally gratifying and impressive.

It is significant that more and more of the labor-management committees engaged in WPB War Production Drives, are turning their attention to a direct attack on absenteeism, often with good effect. The need for such action is as plain to employees as it is to management. And some of the expedients which workers have proposed for dealing with chronic offenders are more drastic than most managements would dare to contemplate, much less to adopt.

The fact is, when Joe Doakes plays outright hookey, he doesn't often fool his fellow-workers. As a result much valuable information currently available on the absenteeism problem is being turned in by labor-management committees in reports to Washington. After reviewing these reports, Louis Falzer, Chief, Statistics and Analysis

Section, War Production Drive Headquarters, handed up a study to the War Production Drive Policy Committee, in which he listed the three causes displayed on page 92 as the leading reasons for war time absence without leave.

WPB's study observes that, in expanding plants where jobs are numerous and money is plentiful, absenteeism is almost double what it is in plants that are static or in which production is decreasing. This confirms a fact long known to management men. In peacetime most managements have recognized that, if business is good, a certain amount of absenteeism is inevitable. Some personnel men believe that a fair average would be about 2.5 percent of total possible manhours. Men *will* go hunting.

But it is estimated by a large industrial company's research department that last year absenteeism for personal reasons was more like 5 percent than 2.5 percent. In July of this year a sampling survey in the same company showed that the figure had climbed to 8.1 percent.

How much of absenteeism is due to personal reasons? No one can tell for sure. But one major war producer checked closely on absences in its own plant recently and found that less than 5 percent of the total was due to actual illness or accident.

Recognizing the fact that long hours, fatigue, and inexperience amid strange working conditions will all conspire to drive upward the total of legitimate absences, WPB proposes to its labor-management committees a three-point attack on absence of all sorts (see page 92).

In addition to the WPB proposals, punishments and compulsions are being used quite widely, a fact which WPB recognizes without indorsing. It is reported that local Selective Service boards in the Pennsylvania hard coal regions have been reclassifying chronic absentees among the miners, for example, although national Selective Service officials frown on such practices. In other cases, extreme measures are being taken to "shame" absentees into reform.

These Methods Keep Workers on the Job

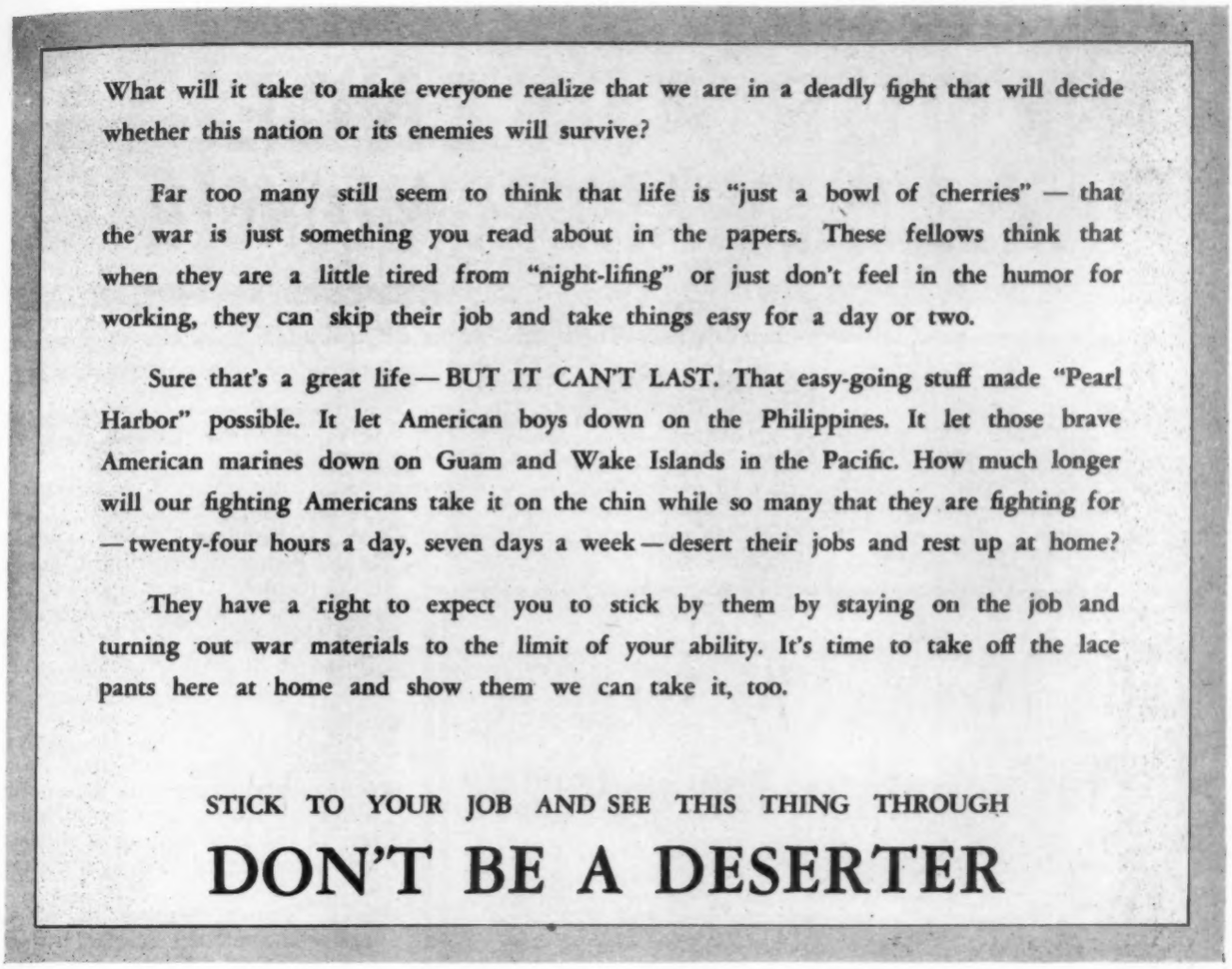
War Production Drive Committee at RCA uses a variation of the door-prize technique to cut down tardiness. Holders of clock numbers turned up on "wheels of fortune" are awarded prizes—if they have been in on time every day. Grand weekly prize is $50 War Bond

1. In one plant, shop committees composed of men with sons or brothers in the armed services were appointed to call on absentees and give them a heart-to-heart talk on the gravity of their error. Plus this, each previous day's attendance was posted on bulletin boards throughout the plant. Result: A 25 percent decrease in employee absenteeism.

2. Some cogent appeals addressed to workers of the Cincinnati Milling Machine Company were these: "We can't make machine tools and make whoopee!" and "The man-days over 3 percent which have been lost since Pearl Harbor were enough to have built all the milling and broaching machines to equip a .30-cal. gun plant producing 60,000 carbines a month."

3. At a DuPont plant in Pittsburgh, employees signed a pledge headed "On the Job Every Day," and in which each stated: "As an American workman conscious of my obligation to the men of our armed forces who are risking their lives that my freedom may endure, I solemnly declare and affirm . . ." This is followed by a 15-point promise beginning, "I will be at my job every day, my health permitting," and including promises to safeguard health, to avoid intemperance, and—an important item—to notify the foreman in advance of an absence whenever possible.

4. At the Newark plant of the Celanese Corporation of America, the already low percentage of lost hours, 1.13, in June was reduced still further to 0.93 in July. Large charts near the



What will it take to make everyone realize that we are in a deadly fight that will decide whether this nation or its enemies will survive?

Far too many still seem to think that life is "just a bowl of cherries" — that the war is just something you read about in the papers. These fellows think that when they are a little tired from "night-lifing" or just don't feel in the humor for working, they can skip their job and take things easy for a day or two.

Sure that's a great life — BUT IT CAN'T LAST. That easy-going stuff made "Pearl Harbor" possible. It let American boys down on the Philippines. It let those brave American marines down on Guam and Wake Islands in the Pacific. How much longer will our fighting Americans take it on the chin while so many that they are fighting for — twenty-four hours a day, seven days a week — desert their jobs and rest up at home?

They have a right to expect you to stick by them by staying on the job and turning out war materials to the limit of your ability. It's time to take off the lace pants here at home and show them we can take it, too.

STICK TO YOUR JOB AND SEE THIS THING THROUGH

DON'T BE A DESERTER

"Take off the lace pants at home" was the plea at worker's pay envelope, was the opening gun in a Tube Turns, Inc. This leaflet, inserted in every campaign aimed at combating the AWOL evil

plant entrances show a daily record of lost hours, summarized by departments. A plant-wide summary is compiled monthly and forwarded to department heads. This includes a list of absent workers. Copies of these reports are then sent to the job stewards through the union representative. Then not only the foremen, but the job stewards as well, "discuss" each absence fully with the absentee.

5. Highly effective use has been made of departmental charts (see illustration on page 96) at the American Screw Company of Providence, R. I. This ingenious chart shows not only the number of employees absent, by departments and plant, but the actual amount of production lost, thus impressing upon employees the way in which absence affects vital war production. In three weeks of operation the American Screw Company's chart reduced absenteeism from between 85 and 110 employees per day to an average of 49 to 60.

"A period of three weeks is too short a time to be too optimistic about the results, but it is showing a good trend," the company reports. Other companies are invited by Harry Mayoh, sales promotion manager, to adapt the chart to their own use. The original, printed in red, white, and blue, is mounted on heavy pasteboard. There are three slots into which the number of employees absent, the estimated loss of production for the day, and the number of workers absent from a particular department can be inserted daily. Cards bearing figures representing all possible multiples were printed at one time, so that there is no delay in posting the daily scores on the board.

6. A labor-management committee at Woodruff & Edwards, Inc., of Elgin, Ill., hit upon this novel plan: Each "AWOL" absentee must work a number of extra hours equal to the period of his absence upon his return, for which he is paid only in War Bonds and Stamps. This is in addition to the regularly pledged 10 percent payroll deduction for War Bond purchases.

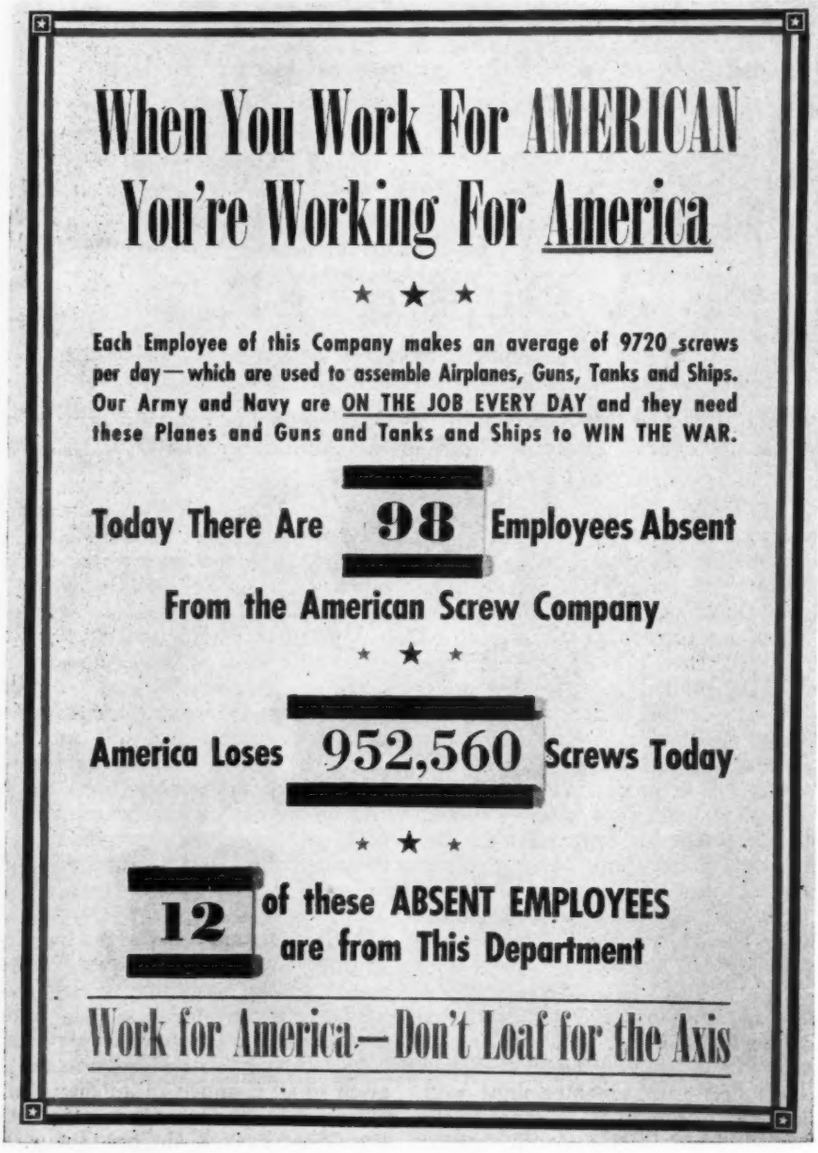
7. Contests, awards, and insignia are also widely used. At the United States Bedding Company, St. Paul, $200 in War Stamps is set aside monthly for attendance contest awards. Teams are drawn by lot. No employee knows which team he belongs to. At the end of the month the records of all the teams, and their personnel, are revealed. Best team splits a $100 jackpot.

8. Banners are awarded to the departments having the best attendance record of the month at Vought Sikorsky Aircraft of East Hartford, Conn. At the Andrews Steel Company, of Newport, Ky., an emblem is given to all members of a department having 100 percent attendance. At the Chase Brass & Copper Company in Cleveland, a perfect attendance

Sample of streamers used to good effect by Tube Turns, Inc., in its drive against needless absenteeism

badge is given to individuals after a 30-day period. For an additional 30 days of perfect attendance, a new badge of a different color is awarded, and the numbers in the center of the badge are changed.

9. At Manning, Maxwell, & Moore, Bridgeport, Conn., latecomers are locked out at the gates and made to do a lot of uncomfortable explaining in the personnel office. Absentees receive telegrams at their homes reading: "War Production workers should be on their jobs. Explain reason for absence." On the second day of his absence, the offender is suspended. His time card is removed and a bright red card reading "AWOL—Report to the Personnel Department" is put up in its place. The company reports that absences, excused and unexcused, have been reduced to 2 percent (see "Breaking the AWOL Habit," FACTORY, October).


When You Work For AMERICAN
You're Working For America
★ ★ ★
Each Employee of this Company makes an average of 9720 screws per day—which are used to assemble Airplanes, Guns, Tanks and Ships. Our Army and Navy are ON THE JOB EVERY DAY and they need these Planes and Guns and Tanks and Ships to WIN THE WAR.
Today There Are 98 Employees Absent
From the American Screw Company
★ ★ ★
America Loses 952,560 Screws Today
★ ★ ★
12 of these ABSENT EMPLOYEES are from This Department
Work for America—Don't Loaf for the Axis

Department charts at American Screw tie absenteeism to lost output

10. At the Carrier Corporation, Syracuse, a figure of General MacArthur finds lodging in the department with the best attendance record. Members of the prize-winning department hold a drawing for $5 in War Stamps.

11. Punitive measures are by no means uncommon. At the DuPont plant in East Chicago, Ind., every case of absence is checked and the cause recorded. Second offenders are warned, and third offenders punished. The labor-management committee at the Walworth Company's plant at Kewanee, Ill., has decreed that chronic absentees must be laid off and their jobs filled by men not now getting full time.

12. Yellow streaks are daubed prominently on the time cards of absentees at R. G. Le Tourneau, Inc. of Peoria. Moreover, all employees who are absent more than one day during a pay period must go to "Hitler's pay table" to get their checks. They also receive a "bonus" of fake German money and elaborate thanks from Adolf.

13. "German money" is also paid to copper miners in Montana, inclosed with this message: "The extra pay inclosed is your reward for failing to report for work one day last week. This money comes from a country that is glad to pay you not to make supplies for our soldiers. When you don't work, you work for the enemy."

14. The great majority of campaigns

against absenteeism remain, for the present, much less drastic, however. Publicity, pleading, and heart-to-heart "pep talks" are the basis of the most typical campaigns. A characteristic campaign is that carried on by the labor-management committee of the Cleveland Tractor Company which achieved a steady reduction in voluntary absenteeism from 22,000 man-hours in April to 9,500 in July.

The committee reports that a man investigates all absences of three days or more. He checks time cards to determine the absentees, then makes a call at their homes. This visit is considered a sociable call and not a truant call.

At the end of the day this list of the absentees and the reasons for absence is given to the absentee committee. The names and numbers with the reasons for absence are then filed for follow-up use. If the reason for absence is illness, the information is turned over to the nurse at the dispensary for a check-up of the man when he returns to his job.

If there is no reason for absence, when the worker returns to his job he is given a little pep talk.

If the absentee is dissatisfied with his job, the matter is taken before the foreman of his department and is ironed out.

Yielding to Attack

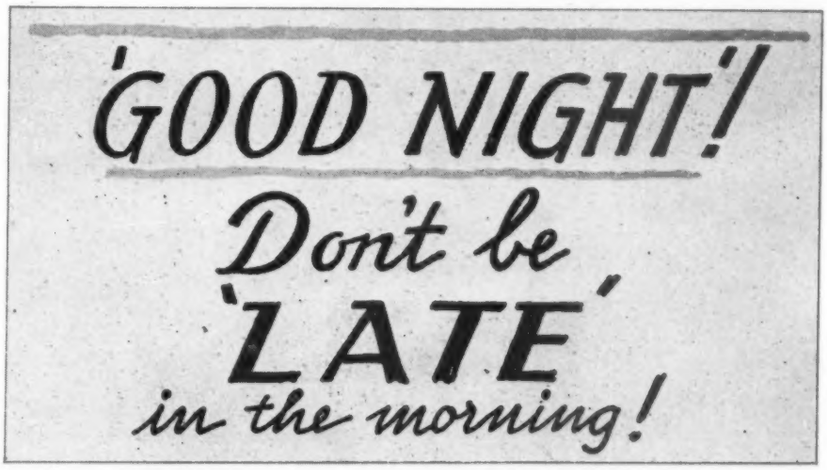
By no means solved, the absenteeism problem is nevertheless yielding to every well-organized attack. But new complications loom. Increasing numbers of women and older workers are entering the plants to replace men of military age. On the basis of the few studies available, the absence rate of women is generally much higher than that of men. Statistical studies by the United States Public Health Service show that the number of days lost from work, by age groups, begins to rise fast after 40, at 55 is twice that of 30, and at 60 five times as high.

In England it has been found that desirable working conditions are far more important in keeping women on the job than men. Such things as rest periods, sanitary facilities, community nurseries, adequate sick leave, vacations, and the like count heavily.

Management is thus seen to face many new problems beyond those which the "psychological" approach and the efforts of labor-management committees can be expected to solve. And the spotlight will swing more sharply than ever to focus on industry's long-continuing and increasingly effective campaign to improve plant health and safety practices.

DO YOU WANT TO LOSE THE WAR?
Stay away from work . . . You got a pocket full of dough
NUTS TO TOMORROW. I MADE $$ BUCKS LAST WEEK—I'M GOING TO STAY IN THE HAY.
It takes guts to keep going back to work when you're "rich". BUT soldiers on the production line are just as important as soldiers on the firing line. You've gotta get in there and work every day if we're going to win this war.

New Departure uses posters to put over an educational campaign



British aircraft factory cut down lateness 50 percent through a series of well-conceived posters. Companion piece to the above was one that read "To all consistently good timekeepers, good morning!"

Miss War Worker Designs

KATHLEEN NORTH

Assistant Editor, *Factory*

MEN WHO TRY TO CHOOSE clothes for women are likely to be in a spot. Maybe one man can pick out dresses for his own family—although there's room for doubt even there—but when a group of men try to decide what hundreds of women will wear for most of the time, the results can be disastrous. The women just won't wear them. To avoid such a situation the Sperry Gyroscope Company put the problem right up to the girls themselves.

It was five years ago that the Sperry Gyroscope Company began to employ women in its shops. At that same time it began to make studies of plant layouts and plant locations, so that it could be in a position of great flexibility in case a war should come.

When the war did break out in 1939, this company was ready to add the factory space and the people it needed. It was then that it became increasingly necessary to add numbers of women to staff its additional factory space.

Not Afraid to Plan

These years of experience in the employment of women have given Sperry the confidence with which to go ahead and plan whatever it believes is needed by them to make them efficient and happy on the job.

Great care is taken in hiring the girls. They have to pass rigid physical examinations. They are given aptitude tests. They are trained right in the plants. And they are told that there is plenty of opportunity for advancement—the faster they learn, the more important jobs they can get.

But, as the numbers grew, one thing was discovered almost at once. Women's clothes, in general, are not made for work on a factory floor. Dresses are not safe. Even if girls can be persuaded to wear typical work clothes, they won't wear the same outfits on the street to and from the job—which means they need locker rooms and a place to change from street

Blue cotton with red on belt and a red stripe down the trouser seam. Some leeway is given in headgear. Light straw at left is not as popular as convertible cap opposite. Both cover the hair

Her Own Work Clothes

"We Want"—Said Sperry Girls

1. Our uniform to be one piece actually but two piece in effect
2. To have the collar shortened enough at the back of the neck so that our hair, or the work-hat we wear, can't be disturbed
3. Our uniform to have no back yoke in the blouse part, because this yoke makes us appear stoop-shouldered when we are bending over our machines
4. Slight fullness in the front, possibly from an unimportant yoke, to veil bust fullness
5. Short sleeves
6. Mannish sleeves, set in squarely for ease in working, and for ease in ironing
7. Two slit pockets, unimportant ones, on the blouse
8. No pockets in the slacks, because they make us appear larger in the hips, and we shall use them if we have them
9. Front sections of the one-piece garment to be in one piece
10. These front sections darted to the limit to keep all extra goods from making us appear larger through the midriff
11. All fullness pleated in at the back, for slimness
12. A hidden "action back" arrangement of some kind; could it be with some knit fabric inserts?
13. No center action back pleat because it will stick out, always, even when we are not needing it, from the position we are in, physically
14. A drop seat that is positively hidden from the public eye
15. Enough depth in that drop seat so we won't tear the blouse seams at the sides
16. Front creases in trousers stitched in
17. Back creases in trousers stitched in
18. A snug belt to accentuate slimness
19. Drop seat designed so it will not sag in the middle of the waistline away from the blouse, especially when we bend over
20. Tapered trousers like ski suits to avoid all that frilly fullness at the ankles when we button the safety straps
21. No safety straps at ankles; if trousers are sufficiently tapered, we shan't need them, and anyhow, they don't look feminine
22. Trousers just long enough to cover and still show our ankles; that will be more flattering
23. Color to be blue, lighter and with more "bloom" than navy
24. The fabric to be cotton, because we may wash these outfits ourselves on occasion, and we may be in a hurry. A too-hot iron can do less damage to cotton than to any other fabric
25. Pre-shrunk material
26. Color-fast material
27. The outfit personally fitted, before we begin to wear it
28. A lint-free fabric because we work on precision instruments
29. An important-looking Sperry insignia, but not the word "Sperry" spelled out; we don't want to feel too labeled if we do wear these outfits on train or bus
30. Fabric soft to our skins; we need that item for 8 hours of almost continuous motion
31. A fly front, with covered buttons
32. A convertible neckline, if possible
33. A white vestee to be designed to match
34. Zippers

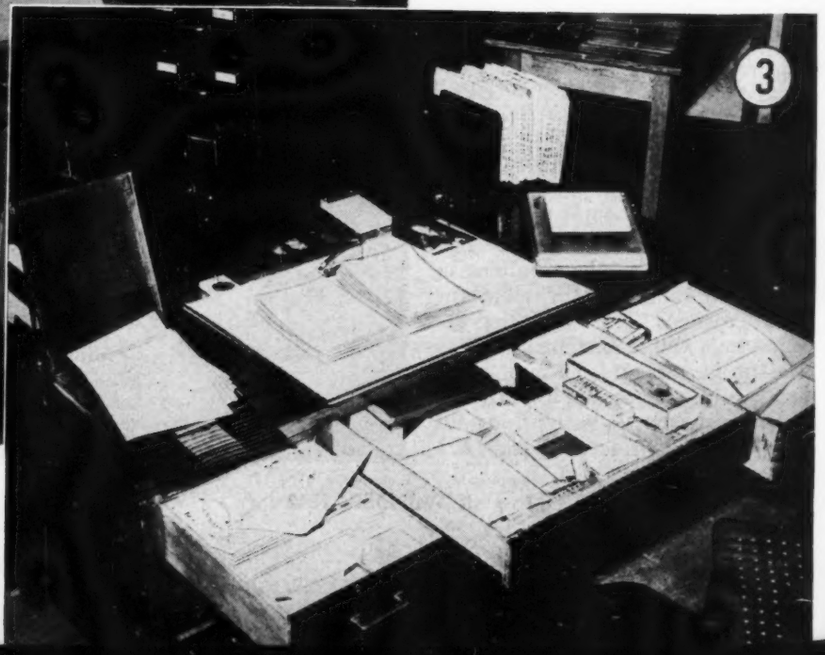
wear to work wear. Space is at a premium, and production has the first call on it. It was decided, therefore, that some sort of uniform was desirable, providing it could be attractive, utilitarian, and safe—and that the urge to wear it could come from the girls themselves.

Sperry managers had a dual purpose when they came to that decision. They wanted to save space—yes. But it was also a matter of morale. Morale is an intangible thing, but probably every plant man will agree that without it production will fall far below its potential. Morale cannot be built merely by giving employees a pleasant place to work in and by sponsoring sports programs. It is something that comes from within the employee himself—or herself. Its outward expression is pride—of accomplishment and in the company. It is the thing that

(*Continued on page* 201)

Work Simplification in the P

On this page—views of production control office at Standard Register before work simplification principles were applied



he Factory Office

LEWIS K. URQUHART, Associate Editor, *Factory*

IF WORK SIMPLIFICATION works in the shop, why not in the factory office? They asked themselves this question at The Standard Register Company in Dayton and came up with some startling changes in design of office furniture and layout of workplaces.

All this came about when increased production indicated the need for more help in the production control department. Unfortunately—or fortunately, as it turned out—there was no room for more desks. So the industrial engineering department went to work on the problem, just as it would tackle one in the shop.

Results are shown here in before-and-after photographs.

What a lot of difference a little work simplification can make! Here's how the production control office looks now that motion study principles have been applied to design of furniture and layout of workplace

1 Just another factory office. No better, no worse, than average. This is a view of one corner of the production control department taken in the old days before work simplification principles were put to work.

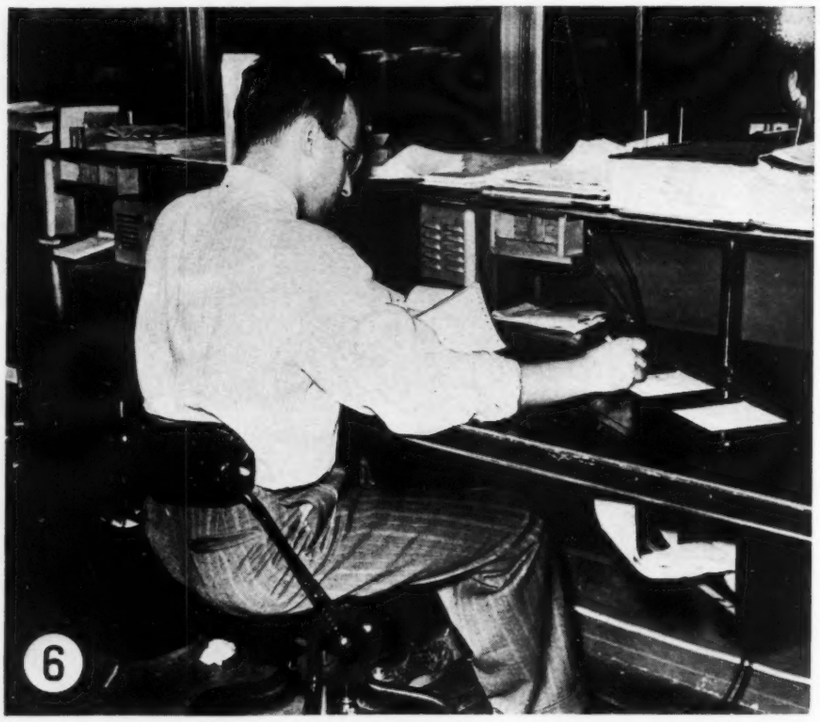
2 Work simplification—in reverse. This man had no room on the top of his desk for a date stamp and pad which he frequently had to use, so he worked out this marvelous scheme. All he had to do when he wanted to use his stamp was lean over, pull out the lower drawer—and there it was!

3 Close-up of a typical desk with all the drawers pulled open to display materials, supplies, and records used on the job. Nothing here that the occupant of the desk did not actually need in his daily doings.

4 After work simplification. Same group of workplaces shown in the first photograph. Note desks replaced with home-made tables. No drawers to serve as catch-alls. Shelves partitioned to hold the various kinds of material used. Stamps, pads, pins, clips within easy reach. Posture chairs to reduce fatigue. Observe telephone used by two men. It's on a little truck which rides a track. The men slide it back and forth as needed.

5 One of a number of production control people who sit at a long table that runs along the wall on two

Work Simplification in the Factory Office *(concluded)*



sides of the department. He follows up and answers outside communications. Big loudspeaker connects him with factory control centers. Small speaker enables him to talk directly to a clerk in the order department. Note file drawer—it runs on anti-friction bearings—also accessible file racks at left of workplace and on the shelf.

6 Another view of the same workplace. For details of production control plan, see article in FACTORY for May, 1939, page 60.

7 New intercommunication system keeps clerk in constant and instant touch with production control centers in the plant. Loudspeaker unit is on a swivel base, so that the girl on the left can use it, too.

8 Workplaces are always stripped for action. Here again, accessible files, compartments for pins, clips, etc. Telephone handy, but out of the way when not in use.

What Small Plants Can Do to Get War Orders

HAROLD DEAS, Associate Engineer of Industrial Production, New York Ordnance District, War Department

★ ★ ★ ★ ★

Out of long experience in interviewing small-plant men, the author sets down the kinds of information he believes they should take with them when they go looking for war orders. His suggestions do not necessarily represent the views of the War Department

★ ★ ★ ★ ★

MANY SMALL MANUFACTURERS are faced with the prospect of having to close their doors, with resulting loss of capital, employment, and productive capacity. Even a superficial contact with this problem uncovers a maze of conflicting opinions. Mr. Large gets all the work; Mr. Little cannot get any. Mr. Large wants to give out only the hard jobs; Mr. Little seeks only the easy jobs. And from both Mr. Large and from Mr. Little one may hear: "It isn't in our line. Give me the order and I'll get the machines. I know where the necessary machines are. I have friends who will help me out. You have got to have pull to get war work."

Out of such a cauldron of conflicting opinions one thought seems to crystallize. Mr. Large has a reputation of wide circulation; Mr. Little's reputation has a limited circulation or no circulation at all.

Either Mr. Little has something to offer to help with the war production program or he hasn't. If he has nothing to offer, the quicker he realizes that he's backing a dead horse, the better off he and everyone else will be. However, if he has any facility through which the war production program can be furthered, he should shout it from the rooftops—but *intelligently*.

Let us consider the case of a manufacturer whose stationery proclaimed he made blue candles, red candles, and pink candles, candles for day use and candles for night use; candles for every possible purpose or occasion. The exact wording of his letter was:

"Gentlemen:

We respectfully request that our name be placed on your list of bidders for any of the work mentioned above, whenever same may be required, to be delivered anywhere.

Our factory, in Blank City, is capable of manufacturing any item made in any material for any purpose.

Thanking you for your compliance with the above request, we are

Very respectfully yours."

That letter was actually addressed to a possible source of machine work in metals. The reader can decide how much attention it received and whether it was entitled to even that much consideration.

Or, if a composite record of interviews for getting work could be made, it would bear a startling resemblance to an unfavorable interview of an applicant looking for a job.

I have a plant and 17 employees. If I don't get work, I'll have to close my shop and my employees will starve or have to go on relief. I don't care what the work is as long as I can do it. Understand, I don't want to make big profits. All I ask is to be able to show my patriotism and a chance to keep my shop going.

I have a wife and 17 children. If I don't get work, we'll be dispossessed, and we'll starve or have to go on relief. I don't care what the work is as long as I can do it. Understand, I don't want to make a big salary. All I ask is to be able to show what I can do and a chance to earn a living.

The response? "We shall be glad to put this information (your application) on file and if anything turns up, we'll get in touch with you."

Mr. Little, you're in a war and you won't accomplish much with a bean-shooter. Get behind a rifle and get your sights on the target. Get straight on several things.

It is in your line to help win the war. You and all the rest of the people in this country are going to have to do lots of things to which you are not accustomed and the sooner you make up your mind to it, the better off you'll be.

Nobody is interested in what you could do if you could get machine tools, priorities, or a piece of the moon. The only thing that counts will be what you can do with what you now have.

Wants What He Wants

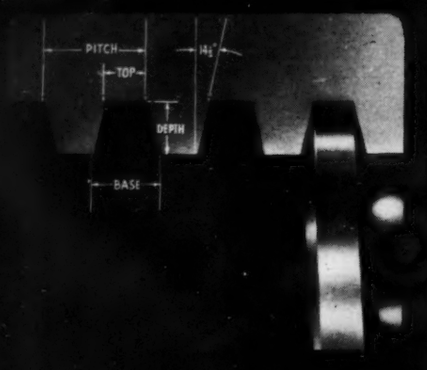
Realize that the man who is in a position to give you an order is interested only in what you can produce that *he* is in need of. Therefore, analyze not only your own capabilities but also the entire situation, particularly how and where your services may best be of value. Skip the idea of any possibility that the war production program can be changed to suit your particular needs, your wishes, or your convenience.

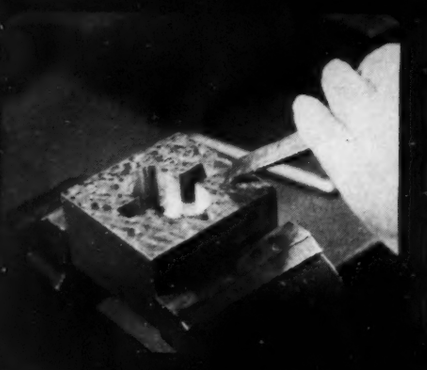
"You've got to have a pull to get war work." Very well, make friends and influence people by presenting your case intelligently through a survey of your plant, or a complete description of what you have to offer. Such a report is expensive in time, effort, and money, if you do it yourself; more expensive if you wish to capitalize on the reputation of an industrial engineer whom you might employ for the purpose; and *most expensive* if, because the survey was poorly done or not done at all, you *fail to get work*.

It is not important, then, whether you make the survey yourself—or have it made for you by an industrial engineer. The important thing is what goes into it. And here, based on personal experience in interviewing small-plant men, is the kind of information

(Continued on page 202)

Films Cut Learning Time





EVERY MAJOR INDUSTRY involved in production of war goods is facing a problem of training new employees. There is too little time for the helper system—a single workman and a single helper working side by side—and every teacher is taken at the price of losing a badly needed skilled worker from the production lines.

Many industries are therefore using the training films issued by the United States Office of Education. These films are intended to assist in training men in the use of various machines and instruments, and are designed to provide a demonstration that will give the student an over-all view of a total operation. Basic principles are taught through the use of specialized motion picture techniques, such as animated diagrams, magnified close-ups, and slow motion. Through the constant use of close-ups from the angle of the operator himself, more students are able to see the fine points of machine operation than they can in the usual physical demonstration.

At the left are "stills" from several films, showing how close-ups and diagramatic shots illustrate points to be made.

Not only of help to trainees, it is believed that demonstration training may help to provide cues to the skilled machinist who, for the first time, must educate green hands.

Forty-eight films have been prepared, on eleven general subjects. In each instance a job has been selected and followed through on a machine with a demonstration of the principles used and with an explanation of general principles of machine shop practice as they apply to the efficient performance of that particular job.

Films obtainable are:

PRECISION MEASUREMENT

1. Steel rule
2. Micrometer
3. Fixed gages
4. Vernier scale
5. Height gages and test indicators

ENGINE LATHE

6. Rough turning between centers
7. Turning work of two diameters
8. Cutting a taper with the compound rest and a taper attachment
9. Drilling, boring, and reaming work held in chuck
10. Cutting an external National fine thread
44. Turning a taper with tail stock set over
45. Cutting an external Acme thread

MILLING MACHINE

11. The milling machine
12. Cutting keyways
13. Straddle and surface milling to close tolerances
14. Straddle milling
15. Plain indexing and cutting a spur gear

VERTICAL BORING MILL

16. Rough facing, turning, and drilling on a vertical turret lathe
17. Rough facing, boring, and turning a shoulder on a vertical turret lathe
18. Facing, turning, boring, grooving, chamfering on a vertical turret lathe using two heads

THE SHAPER

19. Cutting a keyway on end of a finished shaft
20. Machining a cast-iron rectangular block
21. Machining a tool steel V block

THE RADIAL DRILL

22. Drilling and tapping cast steel
23. Drilling to a layout and spotfacing cast iron

SHIPBUILDING SKILLS

24. Preparing and setting a keel block and bottom cradle
25. Interbottom sections—subassembly of a closed floor, of an open floor
26. The interbottom—setting up and fitting floors
27. Side frames—subassembly of a web frame
28. Deck girders—subassembly
29. The deck—setting a web frame and a transverse beam
30. The bulkhead—laying off the boundary stiffeners, water and buttock lines
31. The bulkhead—laying off and fitting a centerline stiffener
32. The bulkhead—setting a transverse watertight bulkhead into the hull
33. Deck plates—regulating and setting

BENCH WORK

34. Cutting thread with taps and dies
35. Scraping flat surfaces
36. Fitting and scraping small bearings
37. Reaming with straight hand reamers
39. Centering small stock
40. Laying out small castings
41. Fundamentals of filing

ACTION, USE, AND CARE OF SINGLE-POINT CUTTING TOOLS

42. Fundamentals of side cutting tools
43. Fundamentals of end cutting tools

OPERATIONS ON THE SENSITIVE DRILL

46. Drilling a hole in a pin

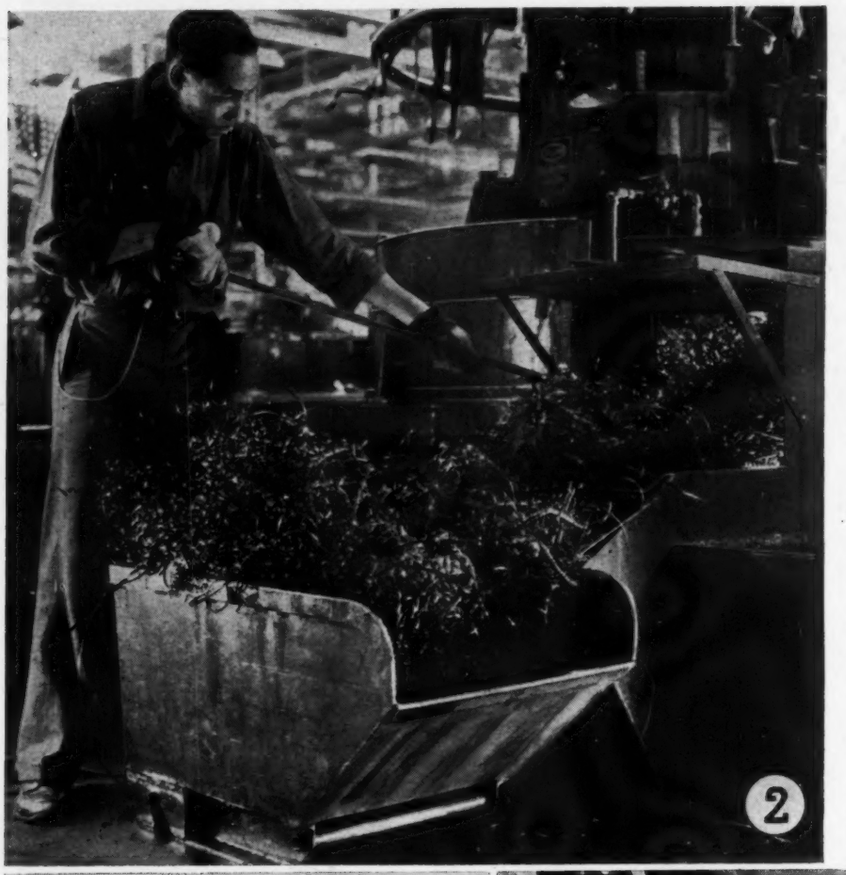
OPERATIONS ON THE VERTICAL DRILL

47. Locating holes, drilling, and tapping in cast iron
48. Countersinking, counterboring, and spot facing

Photographs by courtesy of Castle Films

HURRY CALL FOR SCRAP

1 En route to smelter. As the final step in a new chip-handling system developed at an Ohio plant of Wright Aeronautical Corporation, steel chips are dumped from storage into a gondola car. They represent the invaluable excess metal removed by machine tools engaged in producing Cyclone engines for war planes. Wright engineers say that the tons of metal collected every hour in this plant would in a year's time provide enough steel to build an entire flotilla of destroyers. Chip handling is only one phase of the Wright salvage pro-



gram. For instance, during one week in October, scrap rubber to equip four B-17 bombers was collected in New Jersey plants of the company.

2 First step in the Wright chip-handling system shows chips being raked from a machine into a chip box. The box is hoisted by power lift truck, then moved at once and emptied into a side-dump trailer car which soon becomes part of a trailer train made up to haul the chips to a processing plant. Later steps in the chip-handling system involve crushing and whirling in a centrifuge to remove machining oil.

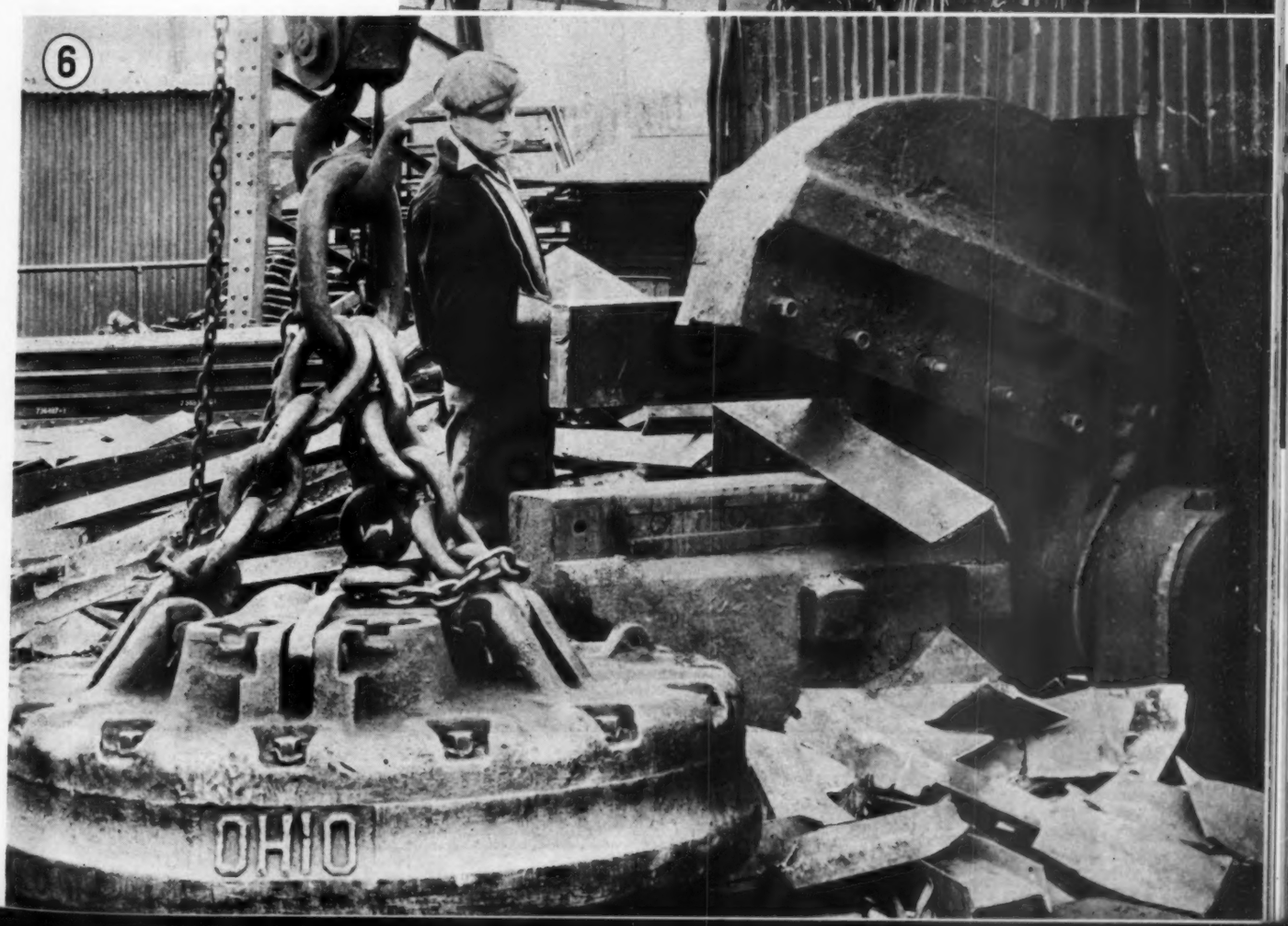
3 Fodder for furnaces. Discarded storage racks are cut up with torches to add to the scrap collected at Edward G. Budd Manufacturing Company. This concern has sent 58,224,320 pounds of scrap metal to the nation's steel furnaces since the first of the year. Budd shipped 6,443,-712 pounds of scrap during August.

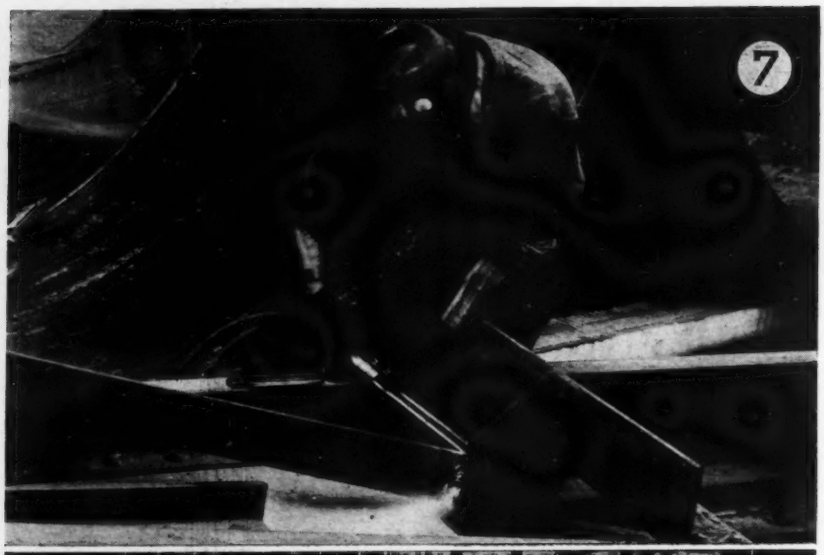
4 At North American Aviation, Inc., metal slugs that have been salvaged from production operations are used in turn to make smaller parts for war planes. In the operation as

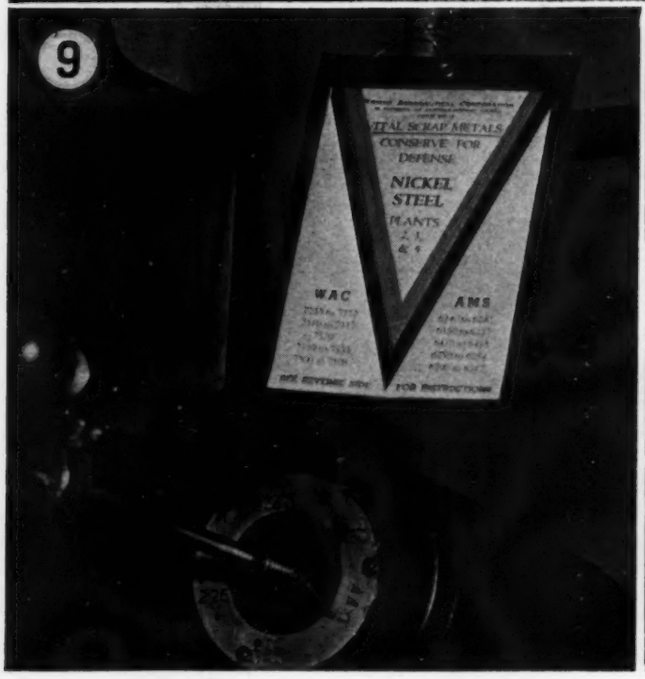
shown in the photograph, the press operator feeds the slugs into the die and removes them by hand. At first glance every principle of safety operation is being broken. Not so, however. Note the safety trips directly under the operator's right wrist and at the left side of the workplace. Both trips have to be depressed before the press can be operated. And, in order to depress them, both hands must be removed from the work area. In other words, the die can't descend until the operator's hands have been completely withdrawn from the danger zone. For other details of the North American salvage program, see August FACTORY, page 105.

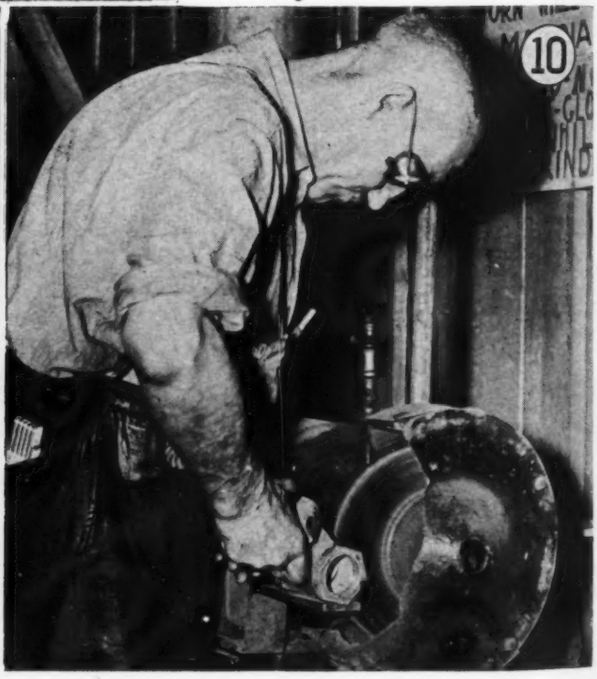
5 Hundreds of thousands of pounds of scrap metal is salvaged monthly by Brewster Aeronautical Corporation. It is carefully sorted, baled, and shipped to refabrication centers. Here, precious bales of aluminum scrap, weighing approximately 350 pounds apiece, are being stacked on Brewster's loading platform, ready to be moved by rail to the melting pot.

6 Function of motor-driven alligator shears at one of General Electric's Pennsylvania plants is to chew up scrap steel to a size suitable for melting furnaces in steel mills. Crane and magnet deliver large pieces









of scrap to the shears, pick up small pieces, and drop them into a freight car for transfer to the mills.

7 For years the M. W. Kellogg Company, which fabricates pressure vessels and piping, has been in the habit of holding a large amount of structural steel shapes in and around its yard. This material has been combed over and anything that is not to be used immediately or in the near future is marked for scrap.

8 Selected tools and dies weighing 150,000 pounds and representing more than 2,000,000 man-hours of skilled labor, were the contribution of E. A. Laboratories to New York's scrap drive. Much of this equipment will have to be replaced on return to peacetime manufacture.

9 Scrap metals look so much alike that segregation must begin right at the machines. Segregation is facilitated and made foolproof at Wright Aeronautical Corporation by attaching a V card to every machine tool to show what material is being processed. Identifying colors on the card match similar V's painted on drums, making it virtually impossible for the scrap to get into the wrong container.

10 Shine 'em up. Last step in a valve reclamation process which begins on the scrap heap at the Du-Pont cellophane and rayon plant in Buffalo, and is a permanent part of the company's 35-year-old salvage and reclamation program.

Significant Labor Developments

Period surveyed: September 10 to October 10

TREND INDICATORS

Office of Economic Stabilization

IMMEDIATELY FOLLOWING the Congressional Act amending the Price Control Law, the President issued an Executive Order limiting wages and salaries and establishing over-all price control. Supreme Court Justice Byrnes was named Director of Economic Stabilization with power to resolve all disputes between OPA and Agriculture on price control.

WLB is made umpire of wages and must approve any proposed increase or decrease.

Teeth are put into the law by imposing criminal penalties for violations together with a refusal to allow deductions in computing taxes and disallowance of costs where a government contract is involved.

Presidential Order Bars Double-Time Payment

Irrespective of any contract or understanding between management and labor, as a result of Presidential order payment of double-time wage compensation for work on Sundays and holidays, as such, is now prohibited for the duration.

The order does not affect provisions for time and one half which must be paid for work on designated holidays and double time on the seventh day of any work week in which the employee works seven consecutive days.

The purpose of the order is to "insure uniformity and fair treatment" to unions which have already voluntarily waived double time or other premium pay for such work. Its applicability is practically unlimited, since it affects all work relating to the prosecution of the war.

Exemption Granted From Presidential Order

The Secretary of Labor is authorized by executive order to grant exemptions to certain industries from the Presidential Order banning the payment of premium wage rates for holiday and week-end work. Although the discretionary freedom was intended for the benefit of the shipbuilding and construction industries, it is not so circumscribed.

Application of Overtime Directive

In interpreting the Presidential directive on overtime the Secretary of Labor has ruled that it is to be limited at present to prime contractors, subcontractors, and material men engaged in government work.

Manpower Commission Directs Migration of Labor

Following the general trend toward job freezing, Manpower Commissioner McNutt ordered that non-ferrous metal and lumber workers in the twelve designated western states may not seek other employment without first securing approval from the United States Employment Service, and that employers may not hire workers who have been engaged in such activities except upon presentation of such certified approval. Approval is only to be granted where it is in the best interests of the war effort.

Wage-Hour Division Restricts Delivery

A consent decree was entered by the federal district court restricting the shipment of "hot" goods, produced in violation of the Wage-Hour Law, until full restitution of back pay had been made to employees. (S. La Grange Company vs. T. J. Moss Tie Company.)

Compensable Training Time

Where war training programs are primarily concerned with protecting management's property, the time spent is compensable. Where it is for the primary benefit of the employees, it is not.

Blacklist Penalty Enforced

The seriousness of the blacklist penalty was well pointed out in the refusal of the Secretary of Labor to heed the pleas of employees and their unions. The company having been found guilty of willfully violating the Walsh-Healey (Public Contracts) Act was fined several thousand dollars, and compelled to make restitution of wages in excess of $27,000.

The Secretary of Labor refused to revoke the order despite the fact that 700 employees would be out of jobs, and that the company itself would be out of business for three years. (Promenade Clothes.)

Employer Entitled to Details of Charges

An employer was held entitled to a Bill of Particulars even though the Administrator's complaint conformed with the rules of federal procedure. The court held that the complaint was too general to enable the company properly to plead its defense, hence it was entitled to know the details on which the Administrator based his charge. (Walling vs. W. Iowa Telephone Company.)

Liquidated Damages Must Be Paid

The seriousness of the damage provision under the Wage-Hour Law was illustrated by a decision that the award of liquidated damages is mandatory. Even though the full amount of back wages was paid by an employer, following a consent judgment, the employee was permitted to institute suit for an equal amount as penalty by law. (Kervin Company.)

Reinstatement Denied

A federal district court denied employees the right to compel reinstatement to their jobs where the discharge was consented to by the union from which the employees were subsequently expelled. The fact that the employees were discharged because they persisted in a wage suit against the employer under the Wage-Hour Law was held immaterial. (Bowe vs. Judson C. Burns, Inc.)

WAR LABOR BOARD

**WLB Alters Contracts*

WLB is experimenting with a new technique in control, namely the formation of a commission to aid in effectuating the Board's order with a minimum of hardship and economic dislocation in the New York-New Jersey area of the milk industry.

The commission is empowered to set aside any part of the collective bargaining agreement between the parties and is given these guiding principles under which to carry out its regulation:

1. All conservation plans must comply fully with the terms of orders of the Office of Defense Transportation.

(*Continued on page 210*)

* In this and the following classification items marked with an asterisk also are considered to be trend indicators.

Invited Workers to "Let Down T

"JUST LET DOWN YOUR HAIR and tell me the first thing you would do if you were in my shoes."

J. H. Kindelberger, president of North American Aviation, recently extended the above invitation to employees in two of the aircraft company's manufacturing plants.

The invitation accompanied a questionnaire sounding out employee opinion, and it drew thousands of replies. The employees had ideas—plenty of them—about the first thing they would do if they were in Kindelberger's shoes. Some, of course, were skeptical about the offer, and one even penned a notation "I have a bet you'll never see this, Dutch." He lost his bet.

"Dutch" Kindelberger read every one of the thousands of questionnaires. He studied carefully the comments written in a section labeled "The Gripe Corner." Kindelberger likes straight, constructive thinking, and when he read an idea that had merit, he sent orders to department heads to follow through.

Employees soon saw the fruits of ideas which they had passed along to Kindelberger. Among the changes brought about as the result of the questionnaire at the plant in Inglewood were:

1. Development of a recreation area where lunch-time programs are now presented for the entertainment of employees.

2. Remodeling the cafeteria building so that food could be served in the new recreation area.

3. Complete resurfacing of the entire parking lot area with oil and rock. (Employees complained that the old surface was playing havoc with the springs on their cars.)

4. Construction of special roofed-in lunch area for the convenience of employees, in addition to other facilities already available.

5. Improvement of the public address system, which is used to present news broadcasts for employees, and the installation of additional amplifiers throughout the plant.

At North American's Texas plant, the first inland aircraft unit to start operation after America began to rearm, numerous employees revealed their dissatisfaction about the staggered, five-day week. A careful analysis of the comments written on the questionnaire forms disclosed that the

QUESTIONNAIRE

☆

1. Do you think that North American is the best aircraft plant in Southern California to work for?
   Yes ☐ No ☐ No opinion ☐

2. Are you proud of North American planes as compared with planes built by other manufacturers?
   Best there are ☐ No better than others ☐ Not so good ☐

3. What is your Number One interest in North American?
   (Check only one)
   ☐ Training for an aviation job in the future
   ☐ I might not get drafted here
   ☐ Opportunity for advancement with NAA
   ☐ Want to make what I can now
   ☐ Feel I'm helping to win the war here

4. What is your estimate of the value of the training you have received from North American?
   $0 ☐ $100 ☐ $200 ☐
   $500 ☐ $1000 ☐ $2000 ☐

5. Do you think you are better off now than you were in 1941?
   Yes ☐ No ☐

   Better off than you were in 1940?
   Yes ☐ No ☐

6. Do you like *Skywriter*, your weekly plant paper?
   Yes ☐ No ☐ No opinion ☐

7. Do you like *Skyline*, the bi-monthly magazine?
   Yes ☐ No ☐ No opinion ☐

8. Do you like the lunch period programs of music and news on the public address system?
   Keep it up ☐ Turn em off ☐ Don't care ☐

9. Do you think the North American Welfare Committee operates fairly and satisfactorily?
   Yes ☐ No ☐ Don't know ☐

10. Do you think the North American grievance procedure operates fairly and satisfactorily?
    Yes ☐ No ☐ Don't know ☐

Their Hair"—and They Did

11. What do you think of the Travelunch system as it is now being operated?

Like it ☐ Don't like it ☐ Better than nothing ☐

12. Do you like to read about North American or its planes in the local newspapers and the magazines you buy?

Yes ☐ No ☐ Don't care ☐

13. Would you like the idea of a home talent show during your lunch period, if suitable space and facilities could be provided?

Yes ☐ No ☐ Not interested ☐

14. Do you have any talent for such a show yourself?

Yes ☐ No ☐ Don't know ☐

If yes, what kind? _____

_____

Please do *not* sign your name to this questionnaire. But tell us a little about yourself by means of the following broad classification questions. They are purposely general so no one could identify you if he tried

I am a man ☐ woman ☐

I have been employed by North American

☐ less than 1 year
☐ 1 year
☐ 2 years
___ years

I work in (check one)

☐ production work
☐ engineering
☐ office or clerical work

I am married ☐ single ☐

My age is ☐ between 18 and 25
☐ between 26 and 30
☐ between 31 and 35
☐ between 36 and 45
☐ over 45

If you complete this questionnaire, and we sincerely hope you will, please bring it with you to work tomorrow and drop it in one of the sealed boxes which will be placed just inside the gate for the purpose

J.D.K.

employees did not fully understand the necessity for this policy.

A statement was published in the Texas plant's weekly newspaper, *Take-Off*, to the effect that a staggered week enabled the company to mushroom personnel out over a longer period of time, making necessary and possible the development and training of additional supervisory personnel within the company. Today the staggered work week is no longer a source of dissatisfaction for employees.

Despite efforts of North American to develop the most modern type of industrial cafeteria system, employees revealed their dissatisfaction about food service at the Texas plant. As a result, the cafeteria lessee reorganized his staff and instituted numerous service improvements.

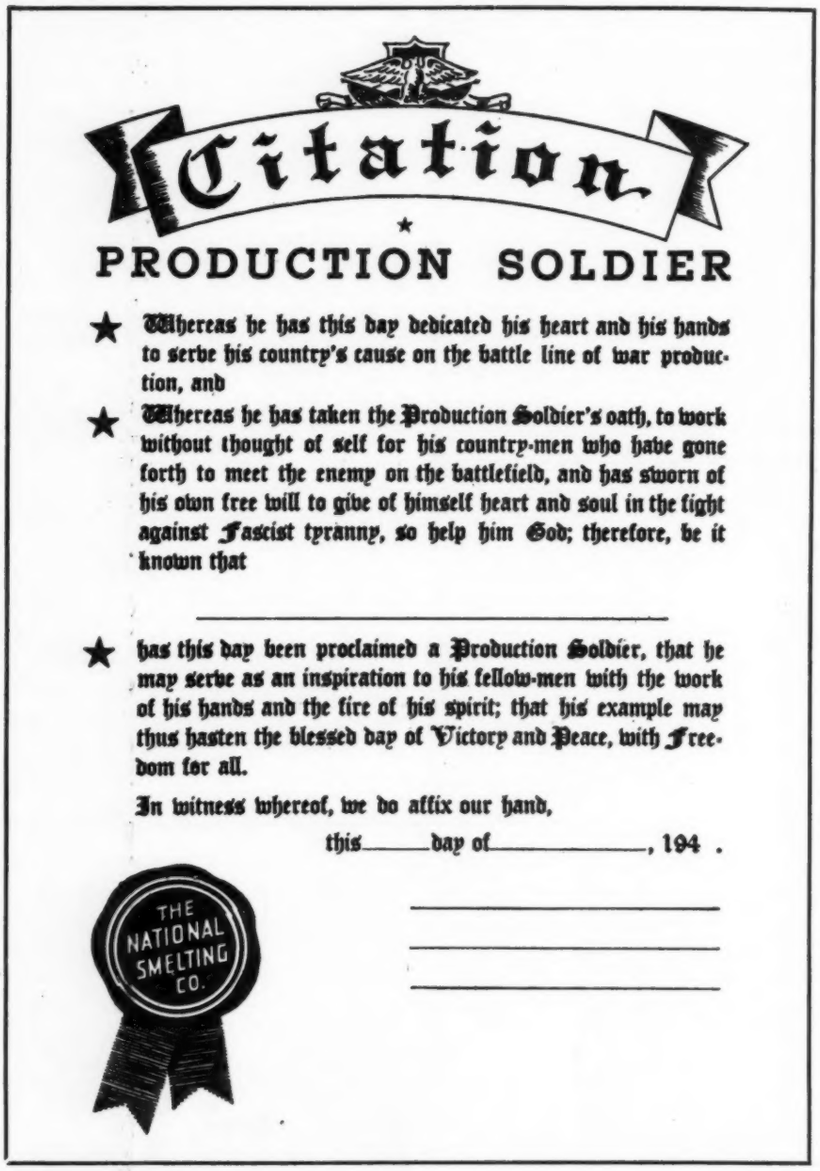
The special radio programs which are broadcast to employees on the day shift at the Texas plant were requested by a large majority of men and women working nights. News and music are now being broadcast during the night lunch period.

Some Texas liked to dance on the concrete ramp outside the factory during their lunch period, and complained because they were prevented from doing so. An order prohibiting dancing was rescinded, and dancing is allowed. Only a few take advantage of the opportunity, but a source of annoyance to employees was removed.

Space on fourth page, illustrated by cartoon, invited "gripes" from disgruntled employees

MANAGEMENT SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary management accomplishments. Accepted articles will be paid for


Citation
PRODUCTION SOLDIER
Whereas he has this day dedicated his heart and his hands to serve his country's cause on the battle line of war production, and
Whereas he has taken the Production Soldier's oath, to work without thought of self for his country-men who have gone forth to meet the enemy on the battlefield, and has sworn of his own free will to give of himself heart and soul in the fight against Fascist tyranny, so help him God; therefore, be it known that
has this day been proclaimed a Production Soldier, that he may serve as an inspiration to his fellow-men with the work of his hands and the fire of his spirit; that his example may thus hasten the blessed day of Victory and Peace, with Freedom for all.
In witness whereof, we do affix our hand,
this ____ day of ____, 194 .
THE NATIONAL SMELTING CO.

"Production Soldiers" Sworn in at Rally

One way to bring home to war plant workers a sense of their immediate, personal responsibility to the nation at war was brought forth at a production-for-victory rally at The National Smelting Company, Cleveland. In a formal ceremony of self-dedication, witnessed by 1200 employees and guests, labor and management representatives enrolled themselves as "Production Soldiers" by swearing a solemn oath, pledging their "hearts and hands to the country's cause on the battle line of war production." The oath was administered by the Hon. Robert N. Wilkin, U. S. District Judge, and each man received a citation certificate (above).

President, vice-president, and general superintendent of the company took the pledge shoulder to shoulder with furnace man, dryer man, and 22 other employees.

Poster Guards Sleep of Night-Shift Employees

SOURCE — Allis-Chalmers Manufacturing Company, Milwaukee

To safeguard the sleep of night workers during the day, Allis-Chalmers has had the appealing poster shown here prepared for distribution. Placed in the windows of war workers' homes, it serves as a warning to the neighborhood that quiet is necessary in the daytime so that men may sleep. Its design calls for six colors, including red, white, and blue.

•

Float Load in Boxcar, Lessen Chance of Shock

F. E. STEMM, Shipping Department, General Electric Company, Schenectady, N. Y.

The "floating load" is a new solution to many diverse problems confronted in the shipping of a great variety of our products—steel mill control panels, rectifiers, motors, generator sets, furnaces, and most other equipment weighing from 5000 to 30,000 pounds loaded in boxcars. Its primary object is elimination of shock to apparatus.

With the floating load method, apparatus is merely placed on the car floor, not blocked solidly down to it, and is held in position by two bumpers, one at either end, and by side braces nailed to the front floor to keep the load from

(*Continued on page 218*)

MAINTENANCE SERVICES

SELECTION • INSTALLATION • INSPECTION • UPKEEP • ORGANIZATION

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CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York, N. Y.

Director of Circulation:
Change my address on Factory Management and Maintenance

From .....

.....

To .....

.....

Signed .....

FACTORY MANAGEMENT AND MAINTENANCE
McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

MAINTENANCE as the Editors See It

It's Time to Stop Wasting Power and Fuel

WASTE OF ANYTHING used in an industrial plant—or anywhere else, for that matter—is definitely out.

Maintenance is not in position to stop all wasteful practices in a plant, but it certainly has the opportunity, and the obligation, to stop waste of power in any form.

Preventing waste of power isn't alone a matter of turning off lamps and shutting down motors that are not in use, important as these items are. Such wastes can easily be seen. Most are not so apparent—for example, excessive friction.

It is impossible to do away with friction, but making sure that bearings are in good condition and properly lubricated—which includes use of the lubricant best suited to the conditions—will do much to keep it low. So will the avoidance of excessive belt tension.

Waste of water means waste of the power and fuel required to pump it. Stopping leaks will help to reduce waste, but education of operators and foremen, and metering and charging each department for the water it uses may be required to bring consumption in line with needs.

Compressed air likewise represents an expenditure of power that can all too easily be wasted through leaks and careless practices.

In many plants a little investigation of the methods of heating plant buildings and controlling temperatures in them will show good opportunities to save fuel.

Ways of saving power and fuel are not always readily apparent—they have to be sought out. If incentive to look for them is needed, it resides in the fact that every kilowatt-hour or pound of fuel saved reduces by that much the burden of our heavily loaded utility and transportation systems.

For Electrical Fires Use Only Clean CO_2 Extinguishers

SAFETY when using portable carbon dioxide extinguishers to smother fires in or close to high-voltage electrical equipment depends to an important degree on the dielectric condition of the horn through which the gas is discharged. That is one of the conclusions drawn from tests recently made by the engineers of Underwriters' Laboratories, Inc.

It is well known that carbon dioxide gas has a dielectric strength approximately 1.2 times that of air, but exact information about the dielectric strength of carbon dioxide snow was lacking. Results of the tests that were made contain both assurance and warning to those who are responsible for the care and use of such extinguishers in fighting electrical fires.

It was found that carbon dioxide snow and gas are non-conductive at potentials up to 100,000 volts, alternating current, provided—and here's the warning—the extinguisher horns have their original dielectric qualities. Dampness or accumulation of dirt may lower the dielectric strength enough to create a shock hazard, particularly where the airgap is small and the voltage high.

Safe practice obviously dictates keeping extinguishers in a clean, dry place and replacing dirty horns, rather than attempting to clean them. Also, while a 10-inch clearance may be sufficient, it is safer not to get closer than 20 or 30 inches to high-potential conductors.

Another point to keep in mind: Although the frost formed on the horn while an extinguisher is operating presents no hazard, its melting leaves a film of moisture. Hence a normal horn may become hazardous if placed unduly close to live conductors during a second or third operation of the extinguisher within a short period.

Don't Let Severe Conditions Wreck Your Equipment

ONE OF THE THINGS that maintenance will learn from this era of "get along with what you have," is the real importance of paying more attention to the atmospheric and other conditions that shorten the life of electrical and associated equipment. At least that is the opinion of one experienced maintenance executive, who is in position to know whereof he speaks.

By way of illustration he cited an instance where three motors were installed in a department in which steam and moisture are present in large amounts. Whenever a motor developed trouble, which happened frequently, it was repaired or replaced. There was some loss of production, of course, but that was all right. Now the plant is operating 24 hours a day, and management must have a bulletproof reason for every production delay. So a way was found to put these motors in a clean, dry place.

An extreme example, perhaps, but not unique. Adverse conditions prevent a good deal of equipment from serving its maximum life. Corrosive fumes, moisture, oil, dust, each in its own way acts to impair if not destroy unprotected equipment exposed to it. With the present difficulty of obtaining new items or repair parts, it is just good sense to correct any harmful conditions, or make sure that equipment exposed to them is adequately protected, either by its design or otherwise.

A Motor Upkeep Program That Gets Results

A. G. FESLER, Plant Engineer, Gardner-Denver Company, Quincy, Ill.

WHEN YOU STOP to think of it, electrical motors, controls, and other equipment give incredibly trouble-free service—if given half a chance. Set up a motor in a room free from dust or moisture, run it at its proper load, oil it, and give it an occasional touch of care. It will last for years.

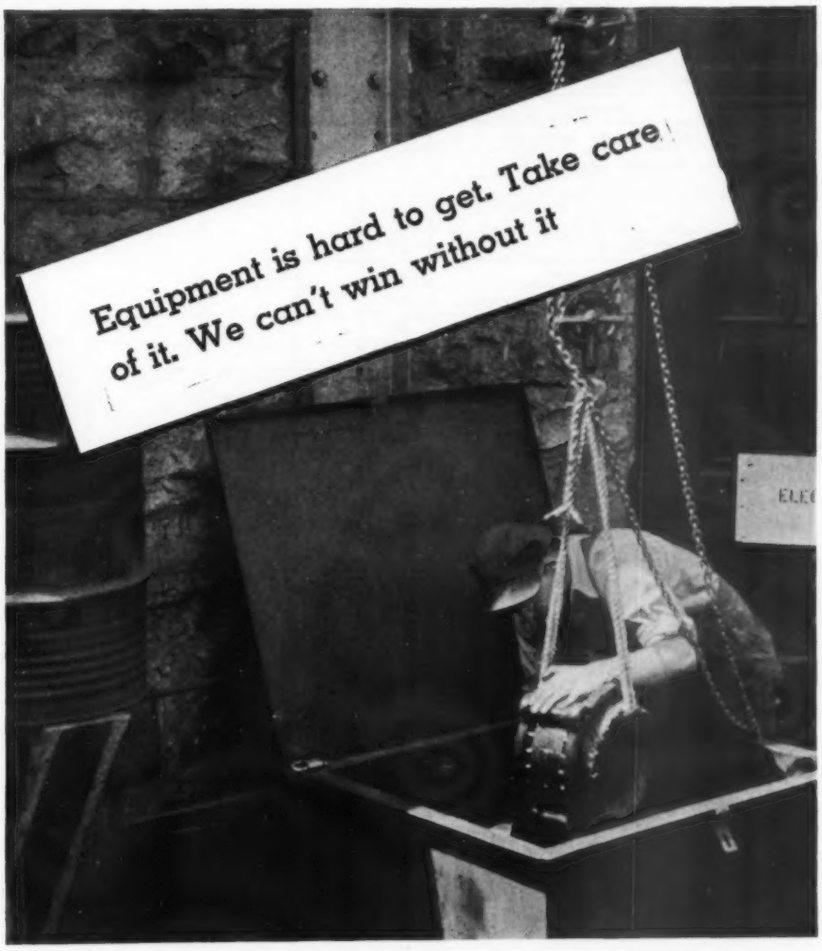
The difficulty in such a program is that, somehow or other, motors and their accompanying equipment seldom get such ideal assignments. They are in the thick of the dusty, wet, generally unpleasant jobs. They get full of dust and condensed moisture, with perhaps an extra dressing of cast-iron dust or corrosive material. They are overloaded. Their oiling is neglected, and all too frequently they get no attention until they quit of sheer abuse.

Neglect Is Silly

To us it seems wasteful, and a little on the silly side, to install good electrical equipment and then let it go to pot. We have about 500 motors, not counting fractional-horsepower motors, and they range from 5 to 200 horsepower. Altogether, we have 2700 connected horsepower. This represents an investment worth taking care of. Accordingly, we try our best to take care of it.

The only workable alternative that we have found to neglecting electrical equipment, is to set up a regular schedule for looking after it, and then hold to this schedule. We have all our motors on a regular inspection cycle. Controls also are given a careful once-over on a definite inspection schedule.

Before you and my other readers in industrial maintenance work object that you cannot get a budget luxurious enough to permit holding a force of electricians on a rigid schedule of inspection every so often, let me plead guilty. Neither can we carry such an oversized staff. What's more, neither do we always make the rounds at the precise day a visit is due. We do keep ourselves reminded that we are supposed to make these check-ups at the stipulated periods, and we turn our attention and our hands to the job whenever any opportunity arises.



When small motors need cleaning, they are taken outside the plant by an electric lift truck, and dipped into a tank of gasoline

Furthermore, we record our actual performance, so that if we begin to fall behind either in our over-all schedule or in our care of a given unit, we get forceful reminders from the black-and-white records.

A major difficulty in our motor maintenance is that we have a bad situation to fight with dirt in general, and cast-iron dust in particular. When we make the rounds every three months, we watch particularly the condition of a motor as to cleanliness, airgap, and insulation to ground.

On large motors, we use a vacuum cleaning unit that pulls a vacuum equal to 46 inches of water. This unit is completely portable, requires no great strength to handle. For it we have a number of hoses, nozzles, and snouts that get its vacuum to work cleaning in the most remote sections of the motor that dust can conceivably have reached. This is our standard method for motors that are too big to be picked up and removed to the electrical shop for cleaning.

When a smaller motor shows a need for cleaning, or when it fails to maintain a test of at least 25 megohms to

CRANE INSPECTION REPORT

Owner Gardner Denver Co. Manufacturer's Serial No. 9913 Shop Tool No. _____

Address _____ City La Grange State Mo.

MECHANICAL PARTS

TROLLEY	CONDITION Good	Fair	Should Replace	BRIDGE	CONDITION Good	Fair	Should Replace
Trolley Wheels	✓			Bridge Wheels	✓		
" Wheel Axles	✓			" Wheel Axles	✓		
" " Axle Bearings	✓			" " Axle Bearings	✓		
" Driver Gear	✓			" Drive Gears	✓		
" " Pinion	✓			" " Pinions	✓		
" Motor Gear	✓			Cross Shaft Bearings	✓		
" " Pinion	✓			" " Couplings	✓		
" Gear Shaft Bearings	✓			Bridge Motor Gear	✓		
Trolley Current Collectors	✓			" " Gear Shaft	✓		
Insulated Trolley Pole	✓			" " " " Bearings	✓		
Trolley Pole Bracket	✓			" " Pinion	✓		
Hoist Motor Pinion	✓			Bridge Brake Band	✓		
" " Gear	✓			" " Wheel	✓		
" " Gear Shaft Bearings	✓			" " Linings	✓		
Intermediate Gear	✓			" " Arms	✓		
" Pinion	✓			" " Bushings	✓		
" Gear Shaft Bearings	✓			Main Current Collectors	✓		
Drum Gear	✓			Insulated Trolley Pole	✓		
" " Pinion	✓			Trolley Pole Bracket	✓		
" " Shaft Bearings	✓			Bumpers	✓		
Mechanical Load Brake	✓			Rail Fastenings	✓		
" " " " Band				" Chocks	✓		
Upper Equalizer Sheaves				" Sweeps	✓		
" " Sheave Bearings	✓						
Lower Block Sheaves	✓			Motor Brake Wheel			
" " Sheave Bearings	✓			" " Linings			
" " Thrust Bearing	✓			" " Arms			
Hoisting Cable	✓			" " Bushings			

ELECTRICAL PARTS

PART	MAIN HOIST CONDITION Good	Fair	Should Replace	AUX. HOIST CONDITION Good	Fair	Should Replace	TROLLEY DRIVE CONDITION Good	Fair	Should Replace	BRIDGE DRIVE CONDITION Good	Fair	Should Replace
Motor	✓						✓			✓		
Motor Shaft Bearings	✓						✓			✓		
" Coils	✓						✓			✓		
" Brush Holders and Brushes	✓						✓			✓		
" Commutator	✓						✓			✓		
Controller	✓						✓			✓		
" Contacts and Fingers	✓						✓			✓		
" Brush Holders												
" Brushes												
" Return Spring	✓						✓			✓		
Resistors	✓						✓			✓		
Limit Switch	✓											
" " Contactor	✓											
Electric Brake Coil	✓											
Switchboard	✓						✓			✓		
Wiring	✓						✓			✓		
Strain Insulators	✓						✓			✓		
Cross Wires	✓						✓			✓		

Date Inspected 9-14-42 Inspection Made By B. Leslie

Inspection of cranes is rigorous. In the Quincy plant 13 cranes are under the care of an electrician who has no other duties. When he finishes one round—which takes about a week—he starts all over again

Location Dept. H Hone — Mach. No. 7

Type Motor Squirrel Cage Induction — Duty Driving Cylinder Hone

Make Westinghouse — Serial 237 — Style 828189 — Frame W-405

Volts 440 — Amps 30 — Phase 3 — H.P. 25 — Freq. 25 — RPM 1450 — Size

Type Bearing Sleeve — Bearing No. 103342 — How Lubricated Ring Oiled

Type Lub Used Oil — Type Starter Westinghouse "De-ion Linestarter

How Operated P.B — Size O.L. 37.5 amp. — Size Cutout Switch 100 amp.

Size Fuses 100 amp. — Make Switch Sq. D — Feeds From South Bus

Date and Reading When Last Megged	Dates When Last Cleaned
Sunday Feb. 1, 1942 ---10 Megs	Oiled --- Sunday Jan. 25, 1942
Sunday Mar. 8, 1942 ---50 Megs	Cleaned --- Sunday Mar. 8, 1942
	Oiled --- Sunday May 3, 1942

In the electrical shop a card for each motor, filed according to department, shows all essential descriptive data, lubrication specifications, and dates when maintenance operations were performed

ground (mostly we maintain 50), we remove it from service and take it to the electrical shop on an electric lift truck. Outside the shop is a tank of gasoline—just plain, automotive-quality gasoline, but without any lead content. Above this tank is a chain fall on a short rail. The tight steel cover is removed from the tank and the motor dipped. Then the motor is fished out to drain, and the tank is again covered. This tank is connected with a small tank above it—an ordinary 50-gal. drum—with a small pipeline and a filter. The gasoline is recirculated through the filter into the upper tank, and remains usable far longer than in any technique that we tried before this method was devised in our shop.

Cleaning Motors Indoors

A not-dissimilar method of handling a motor is used inside the shop in connection with our bake oven. We have a 300-gal. varnish tank in front of and a little to one side of the oven. When the motor is brought here on a lift truck, we hoist it off with a chain fall on a short rail, dip it in the varnish. (This tank, likewise, has a tight-fitting heavy steel cover which suits the fire insurance authorities.) After the motor has been dipped and drained, it is lowered upon a dolly that runs in and out of the oven on rails.

Our need, for the synthetic resin varnish we use, is to bake the motor

A portable vacuum unit, pulling a vacuum equal to 46 inches of water, does a thorough cleaning job on motors too large to be easily moved

at 250 degree Fahrenheit for 12 hours. The oven—which is a home-made contraption—has an outside-reading thermometer, a recording thermometer, a thermostat, and a timeswitch. This is enough control equipment so that we can, as we often do, service a motor on Sunday, put it in the oven, at say, 3 p.m., with the controls set to maintain 250 degrees until 3 a.m., then shut off the currents. Next morning, when the electrician comes to work, the motor inside the oven is cool enough for him to go ahead with, thus reducing to a minimum the time lost from production.

New Bearings in Stock

Airgap is something that we watch carefully, for signs of bearing wear. A rather large stock of new bearings is kept on hand to avoid delays in replacement. However, in urgent need, we make our own replacement parts. This is accomplished under an unusual regulation which prevails in our plant: Whenever any machine part or motor part is urgently needed, the head of the maintenance department can requisition this part from the production departments, and by his written order can give it priority over anything else going through the production departments. Any experienced maintenance man will appreciate the value of this rule to our plant. Instead of standing aloof from one another and each blaming a production delay on the other, our production and maintenance departments jointly undertake to break any emergency bottleneck by their combined efforts. Thus, it is usually broken in a hurry, and production is resumed.

Maintenance of electrical controls also follows a definite schedule. Contacts in line starters are inspected regularly for blistering. They cannot make it on an exact railroad schedule; but every control in the plant gets a going-over at least once a year, and sometimes oftener, if conditions permit. Once a year, on a rather precise schedule, all overload relays are checked to make sure that they operate in the time specified by the manufacturer. We are cranks about this point, because we know that when the overload relay works as it should, burnouts are greatly decreased.

Another motor inspection that occurs regularly is inspection for oil. We use no unskilled oilers. A full-skill electrician makes the oil inspection on every motor every two weeks, though he of course oils only those that need lubrication.

On all jobs of actual oiling, or of general inspection or repair to motors, we require a written report from the electrician performing the work. These reports go to the clerk in the electrical department, for posting to the master cards. In the electrical shop is a set of card files covering each motor in the plant, filed according to departments and according to the machine numbers inside the departments. This card shows all the essential descriptive data, plus lubrication specifications. On it the clerk enters dates when the motor insulation resistance was measured and the motor was oiled and cleaned. Every six months he goes through this file card by card, looking for omissions. Any motors that have apparently been slighted are called to the attention of the maintenance engineer, and he takes steps to have them cared for at once.

Electrical inspection of cranes is far more rigorous than that of any other equipment—because a crane is an essential tool in our operating, and also because if anything goes really wrong with a crane, the cost of the repair itself may be serious. In our Quincy plant we have 13 cranes, from 5- to 15-ton capacity. Of these, four are d.c., nine are a.c. These cranes receive continuous electrical inspection. An electrician has as his sole assignment going over these cranes. When he finishes the round, which takes just about a week, he starts all over again. His task is to make minor adjustments that are possible without interrupting use of the crane, and to report any further repairs that are needed. He checks the controllers, the condition of cable, makes his report on an inspection form that we obtain from a crane manufacturer. In the electrical shop we accumulate these reports, from them set up our crane repair program.

Across the Mississippi, at LaGrange, Mo., we have a foundry which is much smaller than our home plant. One maintenance electrician handles this entire plant, directly under the electrical department at Quincy. He is required to provide an inspection sheet for each motor and each crane each month. Thus, even in a branch plant, the inspection standards of the main plant are held to.

ELECTRIC MOTOR INSPECTION SHEET

Date Inspection Made 9-4-42 By B. Leslie
Location South Facing Mixer Duty Pulls Mixer
Make Westinghouse Linestart Induction Motor Serial No. 1-44 N 360
HP 15 Frame No. WR404 Fl Amps. 20.5 Phase 3
Volts 440 Cycles 60 Type of Bearing Ball
Type of Lubricant Used Superla Grease #57
Oil Level OK Grease Cups OK Drain Plugs Tight OK
Are Average Stator Temperatures _____ Normal Yes
Is Motor Overloaded No
Rotor Clearance OK Resistance to Ground _____
Condition of Comm. _____ Slip Rings _____ Brushes _____
Type of Starter Used Westinghouse "Dricon" Linestarter
Type of Disconnect Westinghouse Circuit Breaker 35 Amps
Rating of OL Device 33.3 to 37.4 Type of OL Device Thermal
General Condition of Motor OK
Do Bearings Run Hot No
Is Spring Tension Correct on Brush Rigging _____
If Belted Drive, Is Tension Correct Yes
Type of Drive Belt Flat _____ Vee Yes
Remarks Correct Rating for O.L. Device 25.6 Amps.

Oiling jobs, general inspection, or repairs to motors all require a written report from the electrician performing the work

Color Makes Machines Safer

FIFTEEN THOUSAND MACHINE TOOLS and other productive equipment had their output raised and were made safer for their operators during the first three months of this year. This increase in output — amounting in some instances to as much as 15 percent—and in safety of operation was brought about by painting certain parts of these machines in carefully selected contrasting colors. There's no telling how many machines have been painted in this way since then.

Use of color on machinery is not new. At least 12 years ago the operators in a well-known shoe factory were given permission to paint their machines any colors they liked or thought would help them to see the work more easily. They did so with abandon and, although the plant took on a riot of color, personal injuries decreased nearly 70 percent.

A year ago Arthur A. Brainerd, director of the lighting service section, Philadelphia Electric Company, announced the results of an exhaustive study of the application of contrasting colors to machines, made in collaboration with the duPont Company, from which the data presented here were obtained. Out of this study has come the principle involved in what is termed Three-Dimensional Seeing because of the stereoscopic clearness with which the work stands out in machines that have been given proper color treatment.

Color Sharpens Seeing

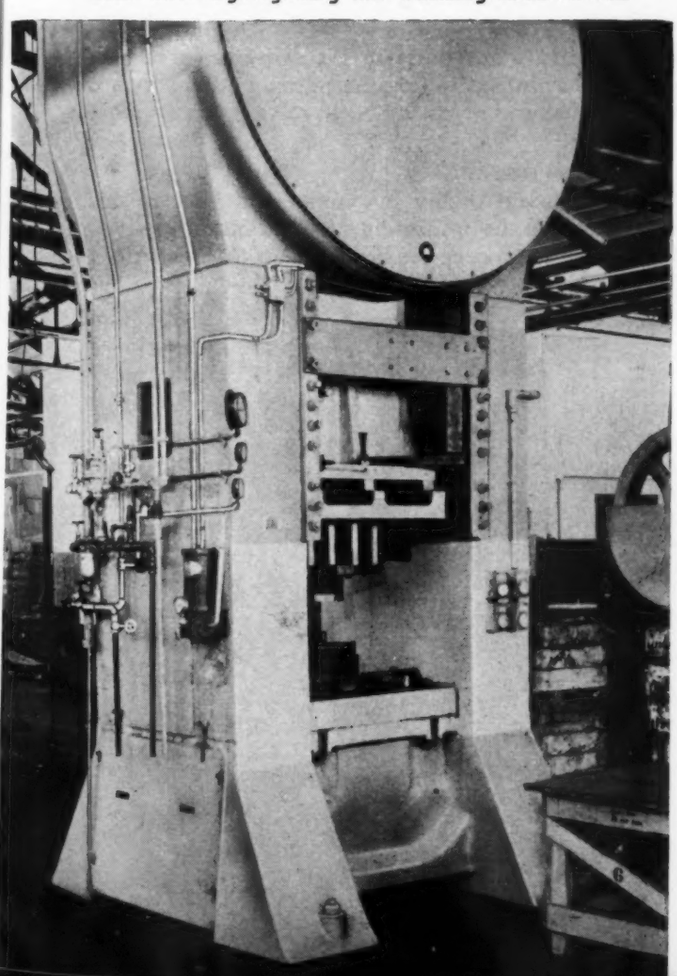
It is based on well-known facts, one of which is that brightness and contrast, or color and light, in the proper combination are required to make strainless, full vision possible. When machines are painted a solid drab color all over, as has customarily been done, some effort on the part of the eyes is required to distinguish moving parts and work from the background of the machine. Failure to distinguish these parts clearly may result in personal injury or defective work. By painting the body of a machine in some suitable color and giving the working area a contrasting hue, that area and its danger spots are made to stand out sharply and clearly. Less eyestrain, fewer accidents, better work are a natural consequence.

Much experimental work has indicated that light gray is the most desirable color for the bodies of machines when a suitable contrasting color such as buff is used to spotlight the operating parts. Buff seems to be particularly suitable for machines working on ferrous metals, although it is satisfactory for many other operations. A light green color is also being used for various kinds of equipment.

It has been found that these combinations of colors create soft contrasts that are easier on the eyes than are abrupt changes in brightness; that these colors are best in reflective qualities; and that operators react more favorably to the buff and gray combination than to other colors tested in the studies that have been made.

On this and the next page are shown typical examples of Three-Dimensional seeing in a number of industrial plants.

Here a 250-ton press has been made safer for the operator by finishing the frame in a suitable gray color and highlighting the working area in buff



Moving parts are danger spots and are finished in red on towel wrapping and labeling machines at Scott Paper Company. Safe areas are green

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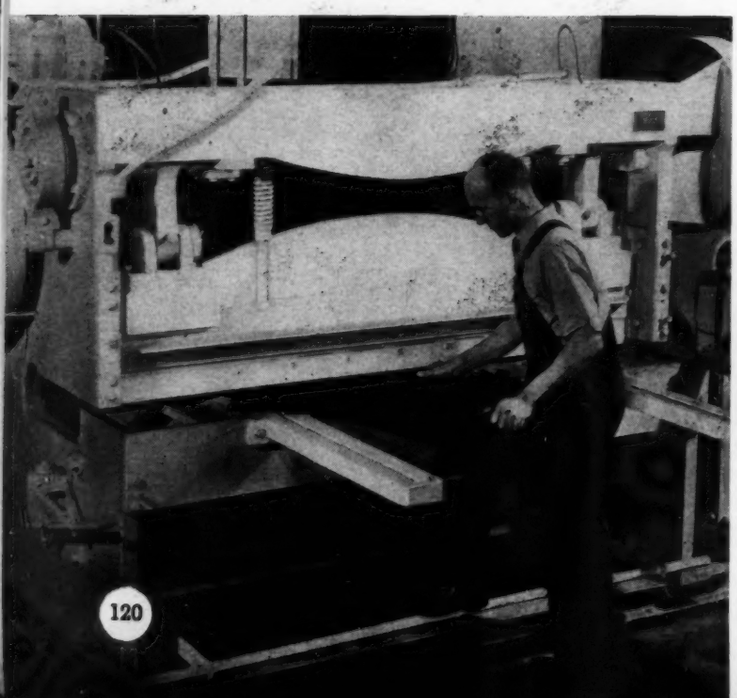
COLOR MAKES MACHINES SAFER *(Concluded)*

Contrasting colors make this towel-folding machine easier, safer to operate. The body is finished in a pastel green; buff is used for guards of loader wheels, and other parts in the working area that need highlighting. Red warns against danger points such as the counting device at the operator's right

Shears can't discriminate between fingers and steel sheets, so working parts spotlighted in buff against a gray background help the operator to be careful



Color treatment of the machines and floor in this shop doubled the utilization of light, made it easier for operators to keep close watch on their work

HOW TO GET THE MOST FROM POWER TRUCKS

INDUSTRIAL POWER TRUCKS are rendering an indispensable service in countless plants to which our country has turned for the weapons and devices on which our freedom depends. These trucks must be kept at work—24 hours a day if need be.

Operate a power truck with reasonable care, give it proper maintenance, and it will work 'round the clock almost indefinitely. Abuse or neglect it and its life and usefulness become uncertain quantities.

Power trucks are designed and built as ruggedly as possible. All parts have margins of safety ample for any reasonable load or service. They are tough and can keep going under a lot of hard work and punishment, if given a fair chance.

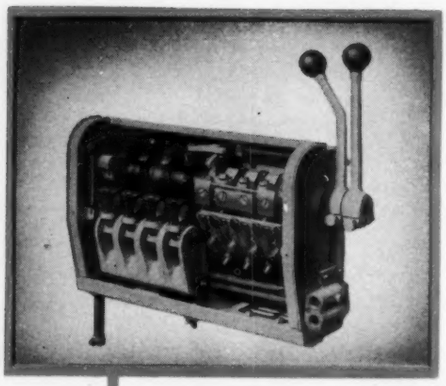
Some day it may be possible to build power trucks that can't be injured by abuse and that can be operated indefinitely without maintenance attention. The best truck that can be made now has unavoidable limitations which must be recognized. These limitations impose certain standards of operation and upkeep that enable a truck to give maximum service.

Careless operation or abuse may result in broken or sprung parts and damage to or destruction of precious tires. At best the usefulness and life of the truck are reduced.

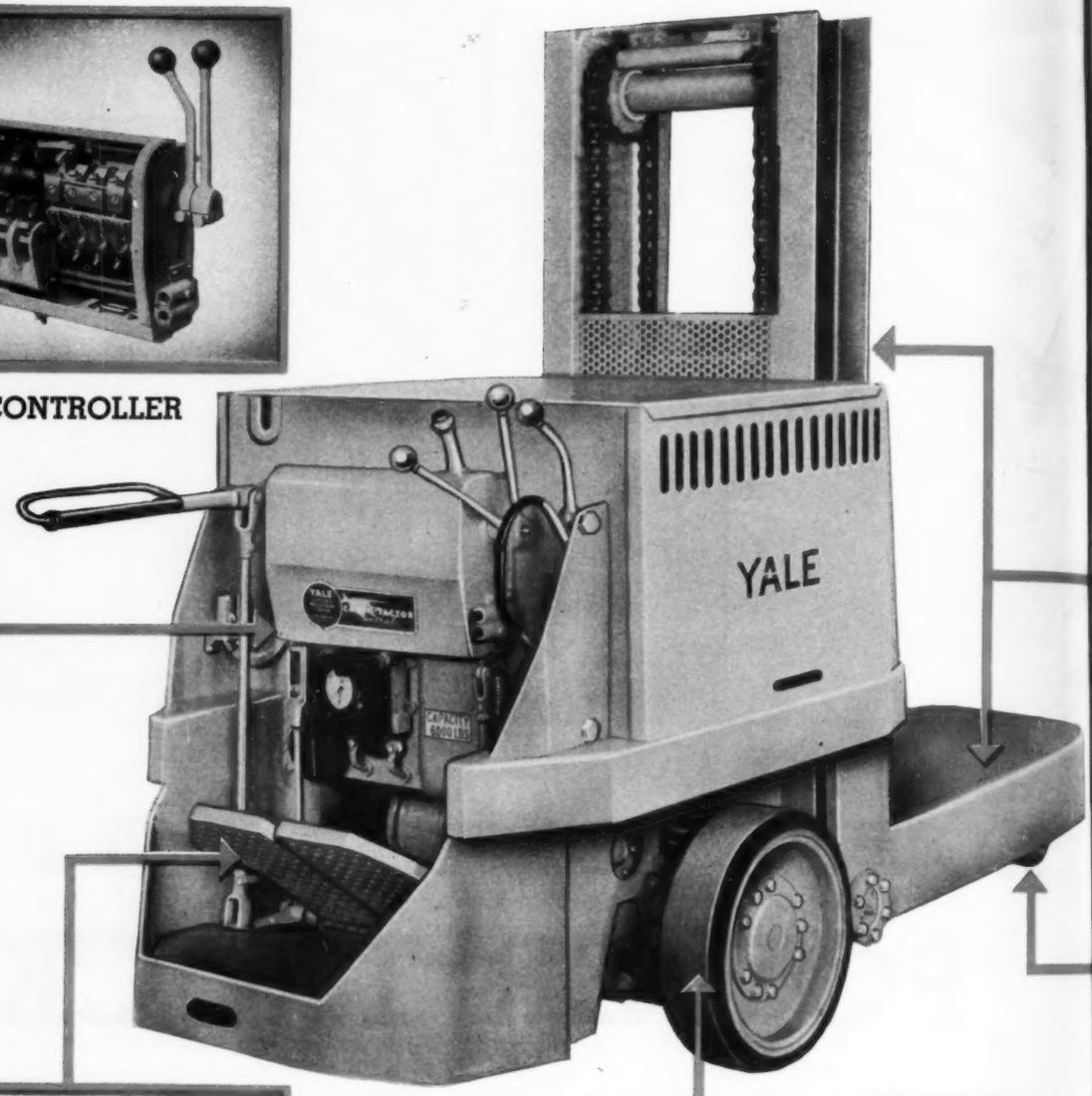
Failure to lubricate bearings and other parts properly, or to inspect regularly so that little defects can be remedied before they become serious, leads to rapid wear and failure, and the need for replacing vital parts—if replacements can be had.

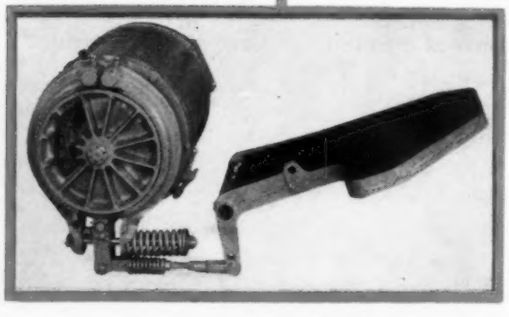
So that FACTORY could tell its readers authoritatively what to do and what not to do in order to get maximum service from their trucks, its editors secured the wholehearted cooperation of truck manufacturers in preparing the advice and suggestions which are presented in the following pages. *CONTINUED ON NEXT PAGE*

These Are the Vital Truck



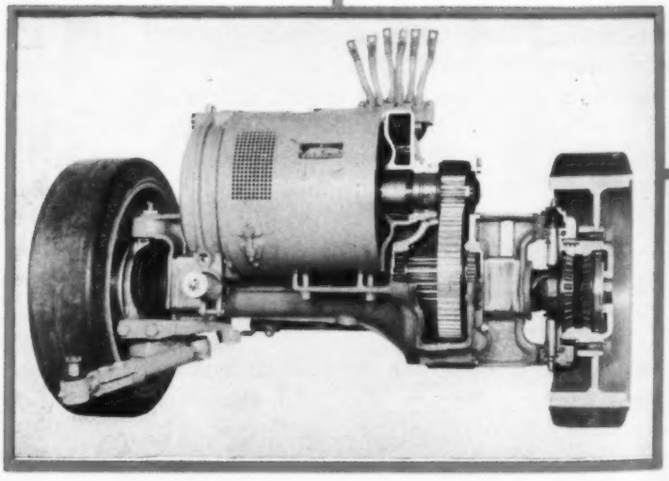
CONTROLLER



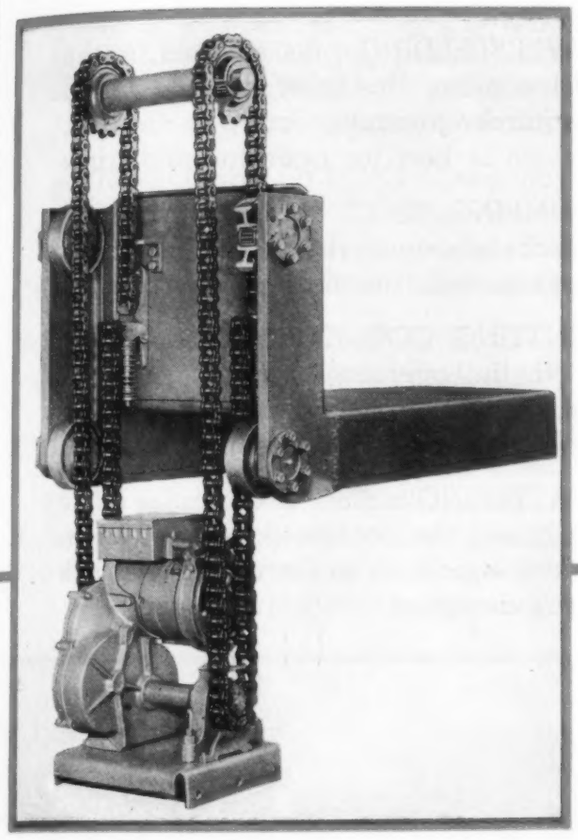


DRIVING BRAKE

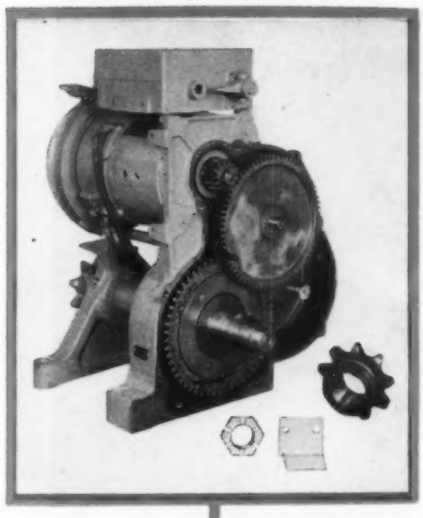
DRIVE UNIT



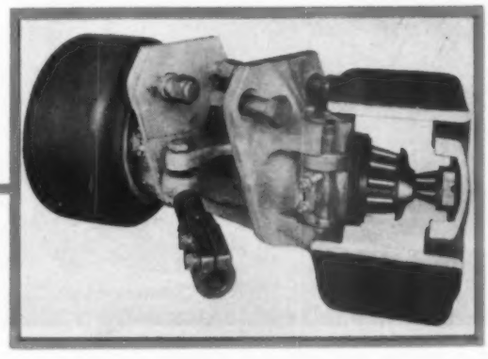
Assemblies That Need Attention



HOISTING MECHANISM

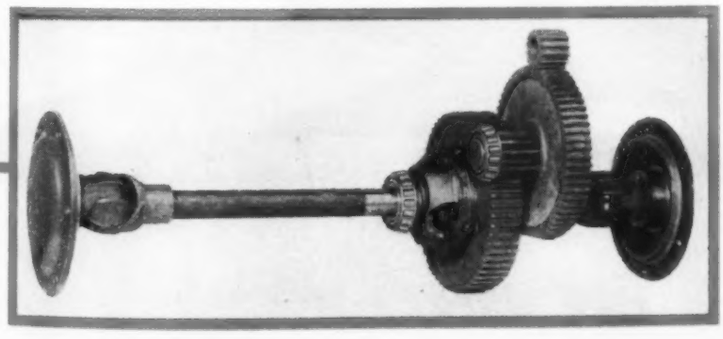


HOISTING UNIT



TRAILING AXLE AND WHEEL ASSEMBLY

DRIVING GEAR TRAIN



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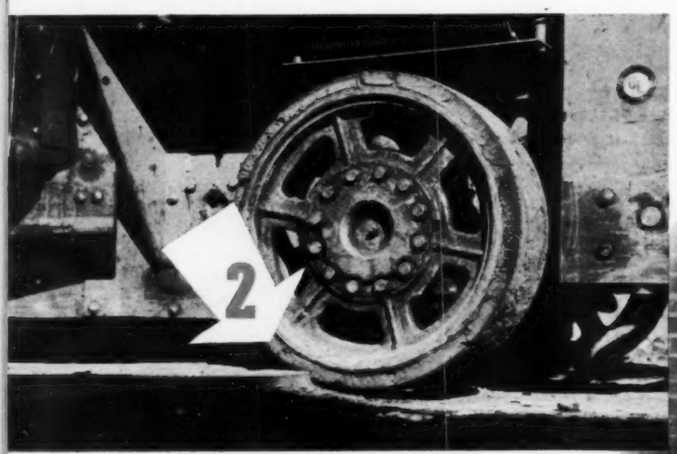
These Are the Abuses

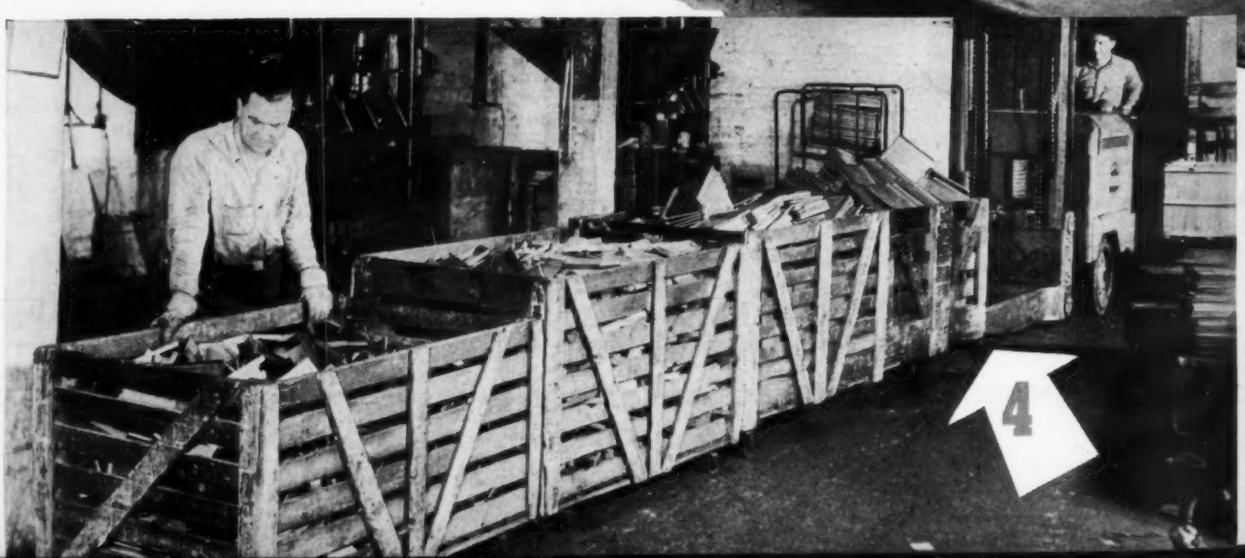
1 OVERSPEEDING puts stresses on the drive motor that may ruin it. Often requires jamming on the brakes, which is bad for operator and truck

2 BUMPING TIRES against curbs and tracks shortens their life, and puts undue strain on the whole truck

3 CUTTING CORNERS can easily put both the operator and the truck out of service for some time—a high price to pay when nothing is gained

4 BATTERING trailers or obstacles aside is about the poorest possible way to clear a path or make room. A truck isn't designed for that purpose





That Send Trucks to the Scrap Heap

5 CARELESSNESS in operation—in this instance neglecting to provide gangplank—may completely wreck truck

6 IMPROPER LOADING—here the load is piled too high—is dangerous to operator, truck, load, overhead structures, and everything else nearby

7 LIFTING WITH ONE FORK, to shift or tilt a heavy weight, racks the whole structure; may cause damage that is very difficult to repair

8 ROUGHSHOD DRIVING over chips and sharp objects is one of the surest ways to keep tires from growing old —they will never have the chance

CONTINUED ON NEXT PAGE

This Is the Maintenance That Keeps

To BE EFFECTIVE, any program of preventive maintenance for power trucks must be intelligently set up and scrupulously followed.

The basis of such a program is careful inspection plus lubrication and prompt execution of whatever repairs or adjustments are needed. Inspections should be definitely scheduled but it is to be recognized that the desirable frequency of inspection for the different parts of a truck varies widely. Some parts may well be examined every day. Others need such attention at periods ranging from monthly to three or four times a year.

A simple inspection report form, such as shown on the opposite page, is the most effective means of making sure that the parts of a truck receive the attention they need at the proper intervals.

Without some such record as this it is difficult to keep track of such matters, detect abuse or neglect, or determine with any accuracy how well a truck stands up in service.

Trucks Rolling

★ DO THESE THINGS ★

EVERY DAY

1. Blow or wipe off dirt
2. Charge or change batteries
3. Oil at all application points

EVERY WEEK

1. Test, adjust brakes. Inspect linings
2. Inspect steering connections for lost motion, wheel alignment, worn bearings
3. Inspect drive and hoist motor controllers
4. Clean and lubricate hoist mechanism
5. Clean air filter*

EVERY MONTH

1. Check level of lubricant in drive unit
2. Wash wheel universal joints, inspect, repack with proper lubricant
3. Inspect and lubricate wheel bearings
4. Check spindle bearings for wear
5. Test and lubricate trailing wheels
6. Inspect limit switches for proper contact, loose parts, correct functioning
7. Check level and condition of oil in hydraulic lift reservoir
8. Inspect motor brushes. See that spring tension is correct

EVERY THREE MONTHS

1. Inspect motor commutators
2. Drain and change oil in transmission*
3. Tighten all nuts, fittings, rods

EVERY YEAR

1. Give truck complete overhaul

* *Applies to gasoline-engine-powered trucks*

POWER TRUCK INSPECTION REPORT

Driving unit, electric
1. Universal joints
2. Leather boots
3. Axle yokes
4. Wheels
5. Tires
6. Torque link bushings
7. Brake adjustment
8. Motor brushes
9. Oil level

Driving unit, gasoline engine
1. Air filter
2. Gasoline filter
3. Clutch
4. Transmission
5. Radiator
6. Generator
7. Fan belt
8. Battery
9. Brake adjustment
10. Oil level
11. Regularity of firing
12. Absence of knocks
13. Power output

Hoisting unit
1. Brake adjustment
2. Motor brushes
3. Oil level

Auxiliary or tilting unit
1. Brake adjustment
2. Motor brushes
3. Oil level

Electric controllers
1. Drive
2. Hoist
3. Tilt
4. Sluing
5. Revolving
6. Power steer

Operator's platform
1. Pedal adjustment
2. Steering wheel or lever
3. Control handles

Trailing wheels
1. Wheels
2. Tires

Load platform or fork carriage
1. Chain adjustment
2. Platform or carriage adjustment

General
1. Limit rods and levers
2. Steering rods and connections

This list covers only part of the important items that need regular attention. It is recommended that the maintenance department draw up, or secure from the manufacturer, an inspection report form suited to its needs. On any such form spaces must be provided for truck number, date, name of inspector, and remarks

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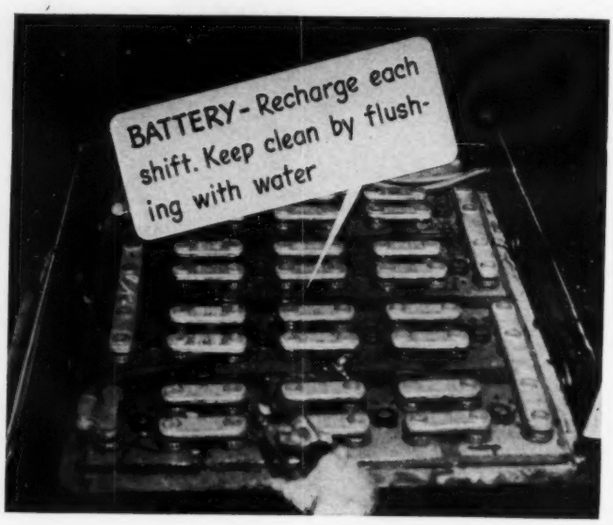
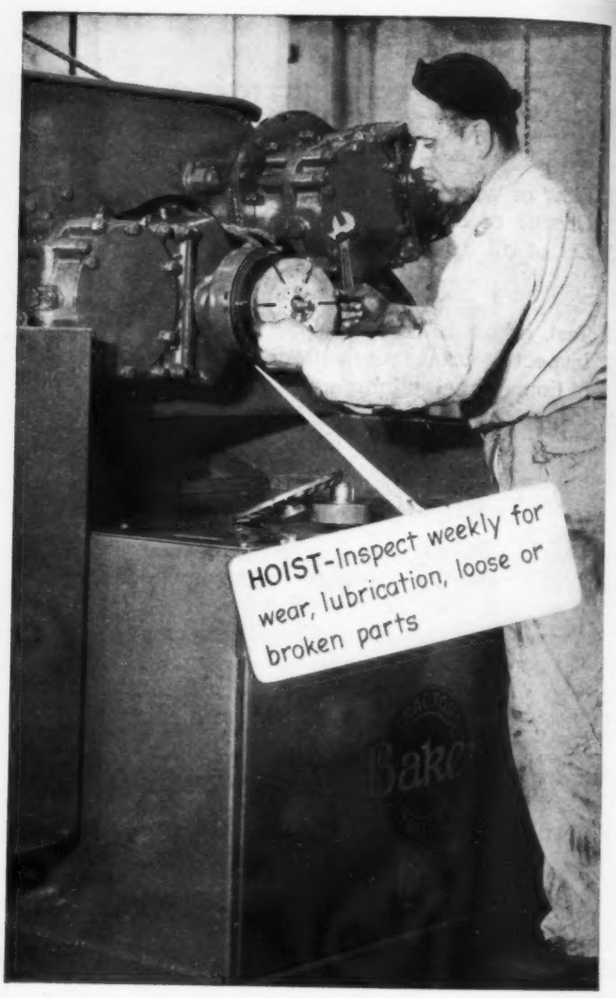
Maintenance That Keeps Trucks Rolling *(concluded)*





Light bounces from the white cement floors to the under side of flat surfaces

Newest for Floors—White Cement

LIGHT-REFLECTING FLOORS are the solution adopted by a number of aircraft manufacturers for the problem of how to light efficiently the under surfaces of wings and fuselages. Undoubtedly such floors can be used to advantage in other kinds of manufacturing plants.

Factory floors heretofore have usually been made of gray cement or other darkish material. Under usage they become still darker, eventually approaching black. Light striking such a floor is absorbed and lost, instead of being reflected.

When Boeing, Consolidated, Douglas, and North American built new assembly plants last year it was decided to install white cement floors instead of the additional lighting equipment that would have been necessary to illuminate adequately the under surfaces of the planes.

In Consolidated Aircraft's Fort Worth plant, extensive tests showed that the white cement floor reflects 61 percent more light than an adjoining gray cement floor. Lighting facilities in both areas are identical. The higher reflective factor of the white cement floor increased the vertical foot-candles 20 percent. To obtain in areas having a gray cement floor the same illumination on the under side of fuselages and wings, and the same vertical foot-candle value, would have increased the cost of luminaires, plus lamp maintenance, and electrical energy for the first year by $31,000 more than the cost of the white cement floor. And a considerable amount of this saving was made in copper, rubber, and other critical materials.

Tests made after the floors were as dirty as they were expected to get, and the time had come to relamp and clean the fixtures, showed that the white cement floor retained more of its reflecting value than the gray floor.

Experience with white cement floors has shown that they are no more difficult to keep clean than the gray variety. Maintenance cost is said to be no higher. Frequent sweeping, occasional damp mopping, and periodic scrubbing are typical floor-cleaning procedures.

White cement floors cost more per square foot than gray floors, but the increased cost may be more than offset by savings in the cost of lighting and air conditioning equipment. It was mentioned previously that a saving of $31,000 the first year was made by installing white cement floors in the Fort Worth plant of Consolidated Aircraft. It is estimated that the yearly saving in lamp maintenance and power costs will amount to more than $26,000. In other plants where the costs and conditions are different, the possible savings obviously would also be different.

The effect of a white cement floor in reducing the initial and operating costs of an air conditioning installation goes back, of course, to the lighting system. When fewer lamps are required to produce illumination, less heat is dissipated by the lighting system. About 1 ton of air conditioning capacity is saved by each decrease of 3.5 kw. in lighting load.

Advantages

1. They promote ease of seeing by reducing the contrast between the seeing task and the background.
2. They make seeing easier and quicker by helping to distribute light throughout the working area.
3. Light is reflected to the under side and vertical surfaces of the work, an important consideration when these surfaces are overhead or on a vertical plane.
4. Dark areas and shadows are largely eliminated.
5. They encourage good housekeeping, because accumulations of dirt and rubbish stand out clearly.
6. By increasing light utilization they offer, in effect, a means of getting more light without installing more lamps.
7. They reduce the cost (and consumption) of copper, rubber, and other critical materials.
8. They reduce costs of lamp maintenance and power.

BUDGETED MAINTENANCE PREVENTS STOPPAGE IN THIS WAR PLANT

M. R. COWGILL
Superintendent, Maintenance Division
RCA Manufacturing Company, Camden, N. J.

M. R. COWGILL was born in Camden, learned his trade at J. F. Buchanan Company, electrical engineers in Philadelphia. Worked several years at a central station, and joined the Victor Talking Machine Company in 1915 as an electrician. Promotions to chief electrician, assistant superintendent of maintenance, and in 1936 to superintendent, followed. He lives one block from the plant. He tried to move away once, but was not comfortable in his mind until he moved back again—to where he feels he belongs

Ultimate standards for calibrating all

· JUST AS THE ARMY has its Engineer Corps to fling bridges across streams, devise tank traps, and fulfill other necessary functions of modern war, so the RCA Manufacturing Company has its own "engineer corps" which has accomplished wonders in re-arranging departments, machines, desks, and other equipment in RCA's change-over from commercial production to full-time work on government war orders.

The RCA "engineer corps" is, of course, the maintenance division, and is charged with the responsibility of keeping the huge Camden, N. J., plant in year-round, tip-top condition in addition to handling such unusually involved tasks as the change-over to wartime production.

The maintenance division, designated at RCA as M-80, requires 354 skilled craftsmen to keep abreast of

meters used in production are kept in the maintenance division

★ War plants must be kept producing all day every day. One-shift upkeep will not do it. Round-the-clock production demands three-shift maintenance

Facilities and manpower are available to rewind and rebuild motors. Two men keep constant watch for signs of wear or misuse

the requirements of the plant. There are two general foremen (day and night) and the following craftsmen: 106 electricians, 76 sheet-metal workers, 49 carpenters, 42 pipefitters, 26 millwrights, 22 painters, 19 laborers, 6 meter repairmen, 5 office workers, a sign painter, and a time-clock serviceman. In addition, draftsmen and structural engineers are busy in the plant service department.

Plenty to Do in Wartime

Always busy in peacetime in keeping the plants physical property up to date, M-80 has run into a blizzard of work since war came. As a matter of fact, some performance records have been established in rearranging whole divisions and departments of the company in the months since the Nazi hordes marched into Poland.

On one occasion, an entire radio manufacturing section of the Camden factory was scheduled for conversion for war production. It was estimated that the job could be accomplished in a minimum of ten days. But exactly six days later the last maintenance man walked off the floor, the job finished. Four days of production time had been saved. Superhuman effort, time-saving devices worked out on the job, and newly discovered short cuts all made the record possible.

M-80 has further refined its technique at re-locating partitions, putting in or bricking up windows, laying floors, changing wiring and plumbing lines, and otherwise actually reconstructing a large part of the interior of huge buildings.

A major job of M-80 was to motorize the more than 50 percent of the production machines which were driven by belt power systems. The change-over was gradual, but so complete that today belt drives are used only in isolated cases. In all, there are approximately 8500 electric motors in use, cared for by two motor check-up men who have no other responsibilities. Ranging in size to 1000 horsepower, the motors operate on 440-volt, 60-cycle, 3-phase power.

As for other use for electricity, there are 26,000 outlets on the 230-volt a.c. line for lighting. The 48 elevators in the plant operate on direct current.

Routine maintenance of the plant requires a substantial day force, as well

From substations to starters the entire electrical system is gone over constantly. A card checking method keeps track of each switchbox, starter, and motor

Much of the material used by the maintenance department comes from the salvage tool crib

as second and third shifts. On the day shift we use six electrical shopmen, a conveyor attendant, two electrical repairmen, three washroom repairmen, three sawdust system operators, two fire alarm men, a laundryman (to clean waste, rags, etc.), one clock repairman, one glazier, two belt men, one truck man, three roofmen, and two street cleaners. During the evening and night hours we also have complete crews scheduled, with the addition of four men to clean and maintain spray booths, which are used mainly in the daylight hours.

Routine maintenance is scheduled from day to day, in order to keep the department operating at maximum efficiency and to assure that every job is done on time. We have arranged a huge blackboard in the shop on which a day-to-day record is kept of man-days worked on each group of buildings in the plant, together with information on expenditures against budget estimates. We have found the board helpful in keeping our work moving smoothly, and in informing the men of our progress. It is great for morale-building.

Semiannual Checking

The 28 buildings that make up the plant are checked twice a year inside and out—at the time we make up our semiannual budgets. Each repair need is noted and scheduled for completion during the half-year following. Each roof is examined and certified at the same time. Window frames are gone over annually. Painting is done on a 5-year schedule. Similarly, a 5-year program of exterior renovation has just been completed.

A complete card-file system is kept on each building. All changes and repairs are noted, so that we have an up-to-date record of everything that has been done to each building since the time it was erected.

The electrical system at the RCA Manufacturing Company is fed by an ultra-modern steam generating plant. Five substations are employed. The entire system is gone over constantly, from substations to motor starters. A card checking system is used to keep track of each switchbox, starter, and motor. All cables are checked at main feeders once a year, and are replaced when required.

Motor maintenance is taken care of by the two motor men who are on constant duty watching for signs of wear or misuse. Facilities and manpower are available to rewind and rebuild motors. A pool of 75 units is kept on hand for emergency use and

for replacement of motors sent to the shop for repair.

Electrical hand tools, such as screwdrivers and drills, are checked about twice a week, with all necessary repair work done in the M-80 shops. The company uses 10,000 soldering irons in the factory, and their maintenance is one of our responsibilities. We re-tip them and make all other repairs, including rewinding the heating units.

The maintenance division is equipped with ultimate standards for calibrating all the various types of meters used in speeding production, insuring quality, and guaranteeing accuracy of the many devices built in the factory. Among the types of meters repaired and reconditioned are a.c., d.c., and radio frequency voltmeters and ammeters, wattmeters, sound level meters, circuit analyzers, electronic voltmeters, micrometers, and many others. M-80 is also called upon to check meters so sensitive that they measure currents of the order of 2 one-hundred-millionths of one ampere, and others capable of measuring furnace temperatures up to 2500 degrees Fahrenheit.

Special Meters Built

Incoming meters are inspected to determine their conformity to specifications. Those failing to measure up are returned to the vendor. Meters for special applications are built by M-80 electricians.

In a plant the size of RCA's, there are thousands of pieces of plumbing equipment to be checked regularly and replaced from time to time. Inspection is continuous, with three men so employed at all times. Leaks are caught promptly and repair and replacement costs are thereby kept at a minimum.

M-80 is equipped to handle emergencies of every type, even though our policy of constant, careful inspection holds breakdowns to a low point. A truck assigned to us is used to rush materials to any part of the plant where an unscheduled repair job may crop up. This is vital in the case of the Camden plant, because three of the largest buildings are located nearly two miles from the main plant. A motor failure out there must be handled with the same dispatch as a similar emergency elsewhere.

Chief Clerk in Charge

The chief clerk in the M-80 office has the responsibility for determining what craftsmen shall be assigned to handle any emergency job, and to get in touch with the proper M-80 officials to oversee it.

Under the emergency classification, of course, comes the comprehensive fire-alarm system that networks the plant. A 20-circuit closed circuit system has 225 callboxes, 240 bells, and 300 miles of wire. The control board, at which a man is stationed day and night, is located in the basement of one of the two office buildings standing in the center of the plant area. A recording device showing each call struck on the system is located at maintenance headquarters.

In addition to possible fire alarms, the system is also used to give start and stop signals for all the factory and office departments. Different starting and lunch hours complicate this task and the attendant is supplied with a daily chart showing him at what time the bells should be struck in each building. In recent months the system has been used to give air raid test warnings all over the plant.

The company is well equipped with portable equipment to cope with emergencies. A gasoline-driven generator may be moved anywhere and cut into power lines to keep production moving in the event of a power line failure. A gasoline-driven water pump is handy because of the plant's location on the banks of the Delaware River, which has been known to reach a minor flood stage on occasion. We also have emergency wrenches, acetylene torches, chain hoists, and other types of equipment.

Two Budgets a Year

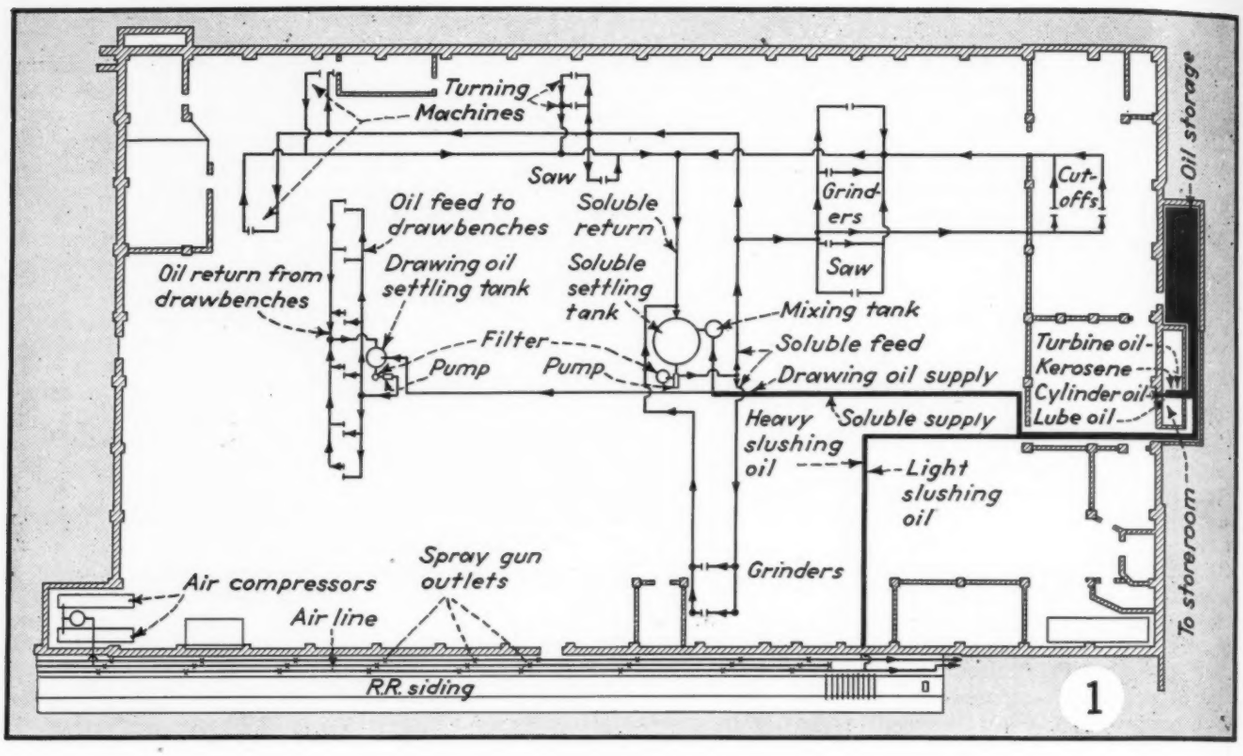
Of course, paperwork in a department as large as ours is quite important. However, we are required to tabulate time only, in order to check with cost estimates, while the plant accounting department does the rest.

We prepare two budgets a year, in January and in August. The budgets are drawn up after a minute examination of the entire plant, to determine the needs for each period. They are submitted to the management of the company, whose approval of the estimates starts us off on a new period.

RCA maintains three and a half miles of standard-gage railroad tracks, feeding into and from the Pennsylvania and Reading systems, so that freight-cars with raw materials are run directly into the factories, drawn by RCA's three yard locomotives. There are more than four miles of conveyor systems to carry the various apparatus along in progressive stages of manufacture through the plants.

Every month more than 3600 tons of coal is consumed in the power house and furnaces, to produce light, heat, power, and process steam. Ninety-two million pounds of steam is generated each month, part of it used to make nearly 2,000,000 kilowatt hours of electricity. Fifty million cubic feet of compressed air is used per month for air drills, air guns, air presses, and to operate other pneumatic machinery. Ten million gallons of water is consumed for processing purposes each year.

For emergencies a truck is assigned to rush men and materials to any part of the plant where an unscheduled repair job may come up



Pipelines for Shop Oils

Handling shop oils can be a very complex problem. Or it can be no problem at all—if, as here, oils are centrally stored and piped to points of use

An oil distribution system recently completed at the Gary plant of the Union Drawn Steel Division of Republic Steel Corporation has improved machine maintenance and cut oil consumption and container handling cost to such an extent that plans are already under way for similar installations at four other plants of the company.

All oil handling has been centralized. Previously soluble oil was distributed around the plant in individual barrels. Used as a coolant for the metal saws, lathes, and grinders, the oil was mixed with water as needed. Any one of several individuals handled these mixing operations with the result that the supply varied widely in consistency and was frequently not satisfactorily proportioned. Distributing the soluble oil from a centralized system, on the other hand, has made it possible to put the mixing into the hands of one man. This makes for absolute uniformity of results and for proper consistency at all times.

Establishing a central reservoir of soluble oil also has eliminated one of

the problems always present with small self-contained systems. The many times larger quantity of soluble oil in circulation gives the oil a chance to cool off before being returned to the machines.

Likewise, with centralized control of coolant and drawing oils, the pressure at which these oils are delivered to the point of use can be kept more uniform. Generally, too, the oils as they are returned to service are cleaner than when handled in any other way.

From the centralized storage room, iron pipelines, carried close to the basement ceiling, and of varying sizes depending on the viscosity of the oil handled and the length of travel involved, carry the different oils to four principal points in the plant: (1) The storeroom, (2) the shipping department, and to settling tanks for separate (3) drawing oil and (4) soluble oil distribution systems.

All oil lines pass from the underground storage vault through a short insulated tunnel provided with steam-heated coils to insure the maintenance of at least 70 degrees temperature, even when outside temperatures fall as low as zero. This tunnel carries the pipelines into the main section of the plant basement.

1 Eight different petroleum products are pumped in separate pipelines to individual machines and points of use throughout the plant, which produces bars, wire, precision shafting, and special shapes of cold finished steel. Turbine oil, kerosene, cylinder oil, lubricating oil, soluble oil, drawing oil, and two grades of slushing oil (light and heavy) are handled in this fashion.

The soluble oil is used as a coolant for metal saws, lathes, and grinders. The drawing oil is required for lubricating the dies used in cold drawing bars. The two grades of slushing oil are used for spraying a protective film on finished stock as it is loaded into railroad cars on the long depressed siding that runs into the plant.

The longest and most extensive of the oil circulating arrangements in the plant, the delivery side for the soluble oil, involves 680 feet of pipe, graduated in size from three inches to three-quarters of an inch. On the return side, 630 feet of pipe from four inches to one inch in size have been used.

2 Delivered to the plant by truck, each grade of oil is allowed to flow by gravity into its individual storage tank in a ventilated underground vault through 2-in. filling pipes brought up inside an accessible concrete inclosure by the plant building.

Weatherproof hinged covers on each oil line and locks on the sheet-steel cover of the inclosure provide effective protection against fire, theft, or other hazards.

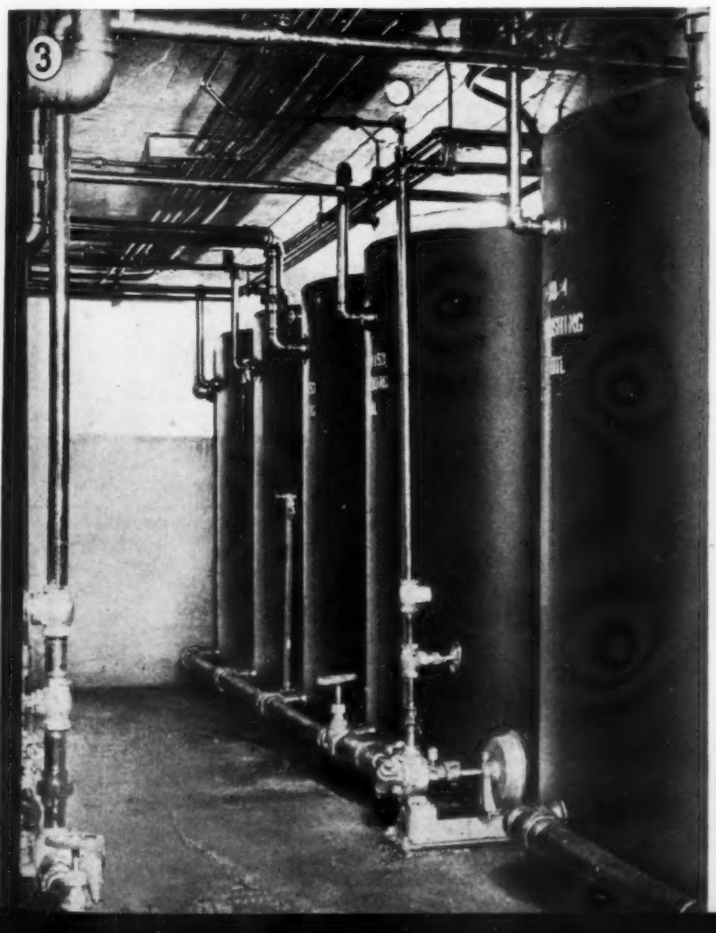
3 Storage vault houses eleven 280-gal. tanks, installed vertically side by side, and a twelfth, also of 280-gal. total capacity, which has been divided into three sections and mounted horizontally on a tank saddle of all-welded steel construction.

Eight vertical tanks, connected together in batteries of four tanks each, handle slushing oil of two grades. Turbine oil, drawing oil, and soluble oil are provided with separate storage tanks. Lubricating oil, kerosene, and cylinder oil are handled by allocating to each one section of the three-section tank.

Gear pumps, equipped with relief valves on the pump heads, are used on all eight oil lines fanning out from the central storage vault. They are driven by explosionproof, 3-phase, 220-volt, 60-cycle motors. On the soluble oil installation and on the drawing oil installation, where an interruption to supply would seriously inconvenience plant operations, two such pumps, one a standby, have been installed on each set of storage tanks.

4 In addition to the ordinary control switches on the motor circuits, mercoid switches have been installed on the pump handling the slushing oil, the light oil, and on the main and standby pumps for the soluble oil, to take care of the situation created by a tendency of these oils to leak past the diaphragms of ordinary pressure switches and render them inoperative. Motor starter switches and pressure gages are grouped on the wall outside the storage vault.

Ventilation of the storage vault is



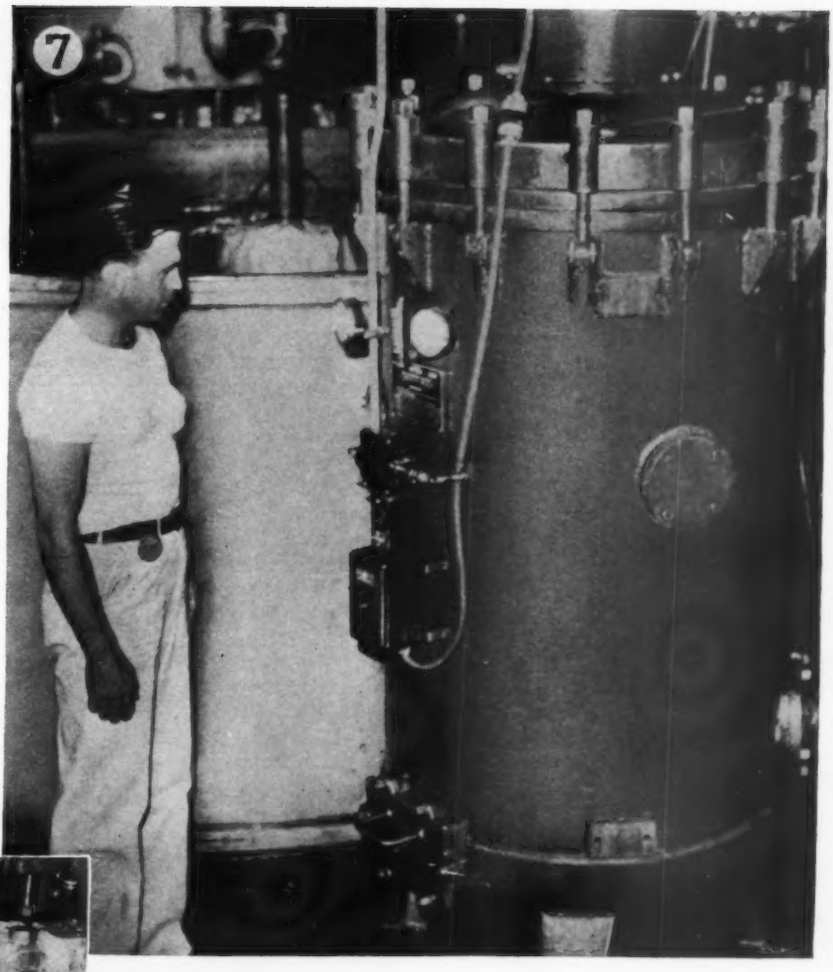
provided by the installation of 4-in. pipe sections at both ends of the room which exhaust to the outside atmosphere.

5 Four lines carry turbine oil, kerosene, cylinder oil, and lubricating oil to the storeroom, where they are dispensed in small quantities. Kerosene and lubricating oil are pumped under 20-lb. pressure. This is increased to 40 pounds for the turbine oil, and to 60 pounds for the cylinder oil. For identification, pipes are painted yellow for turbine oil; red for kerosene; blue for cylinder oil; aluminum for lubricating oil. All soluble oil lines are painted white. Pipes painted brown deliver heavy slushing oil. Black pipes handle light slushing oil. Piping for drawing oil is green, and gray pipes carry air.

6 Because some finished steel is shipped by truck from the plant, a portable slushing outfit also has been provided. It consists of a small, mobile unit on which is mounted self-contained pumping and air-compressor equipment. Separate 54-gal. drums carry light or heavy slushing oil, which is sprayed from this equipment.

Eleven stations are provided along the track loading zone where spray gun equipment on 25-ft. lengths of hose can be attached to either oil line and the finished steel sprayed as it is loaded into the railroad cars. Oil and

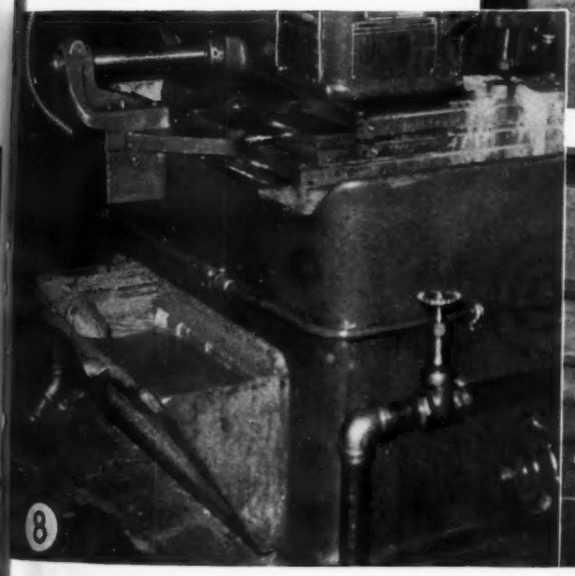
air outlets have been equipped with fast coupling connectors, to speed attaching and removing the spray units.

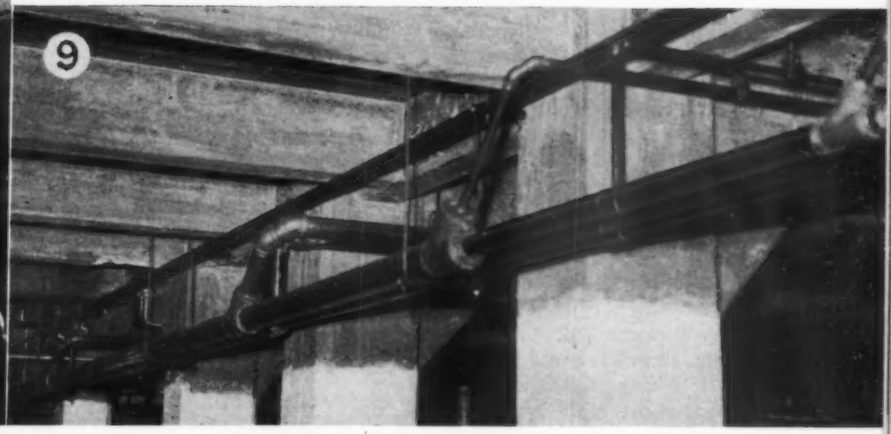


7 Lathes, grinders, cutoffs, and saws require a quantity of soluble oil in their operation. To provide it, a self-contained and self-cleaning distribution system has been set up with supply and return lines to handle the soluble oil to and from all equipment.

Heart of the system is an open settling tank in the basement of the plant. The soluble oil is pumped from storage through 178 feet of 1¼-in. pipe to a small measuring tank immediately adjacent to and elevated above the settling tank. It is mixed for use as a coolant in proportions of 10 to 1 with water which is introduced into the settling tank directly from a plant water main. From the settling tank the coolant is pumped under 40 pounds of pressure through a self-cleaning coolant filter to the machines on the floor above. It returns by gravity to the settling tank.

The abrasive particles which are picked up in the coolant oil would produce excessive wear on a gear pump, and consequently a centrifugal pump is used for this assignment.





8 At each machine, whether grinder or lathe, there has been installed a primary settling basin to remove as many as possible of the metal particles, chips, etc., which would otherwise be returned through the piping to the main settling tank.

The carborundum bonding cement or sizing used in the composition of grinder wheels, for example, would quickly clog even a good-sized pipe if permitted to pass through in any quantity. The individual settling basins at each machine, therefore, consist of a wire basket suspended in a sheet metal basin. The coolant is discharged from the machine into the metal basket which holds back most if not all of the objectionable foreign matter from entering the return line to the settling tank.

9 At all junction points in the return lines from the settling basins, 45-deg. Y bends in the direction of flow are used to minimize any possible clogging of the lines. Likewise, all return lines have a minimum number of bends and fittings and have been kept as nearly as possible in a straight line.

At the settling tank the return line empties into a screen basket of 100 x 100 mesh welded to and reinforced on the outside by a perforated shell having ½-in. holes on ¾-in. centers. This basket arrangement permits the oil to dissipate its initial turbulence before flowing into the settling tank.

Switchgear for the War Plant

M. H. HOBBS, Manager, Switchboard Section, Switchgear Engineering, Westinghouse Electric & Manufacturing Company, East Pittsburgh

IF POWER FACILITIES are to be installed or increased, the primary voltage will usually be the highest utilization voltage of the plant, and will be limited to 2300, 6600 or 13,200 volts. Metal-clad switchgear is recommended for any of these voltages. With modern breakers and switchgear, a double bus structure is not needed unless for some operating procedure, such as isolating the load for some process. All necessary flexibility can be obtained by a single bus, sectionalized by breakers.

For plants of small or medium size, instruments and relays can be incorporated on the panels of the switchgear, thus eliminating a separate switchboard and the conduit and control cable runs between it and the switchgear structure. Conditions may dictate the installation of a switchboard or benchboard separately situated from the main switchgear. If so, it can be constructed of steel, with flush-type instruments and relays.

For Repetitive Duty

The 440-volt auxiliary circuits can be fed from low-voltage metal-inclosed switchgear with air circuit breakers. The breakers should be draw-out type because of the class of service and its importance. For the same reason the breakers should be suitable for repetitive duty, as some of the circuits will undoubtedly require service of this kind, where motors must be started frequently. These small structures are usually shipped from the factory completely assembled, thus reducing the installation time and expense.

If 2300-volt auxiliary circuits are required, as in the larger stations, the switchgear is similar to the main structure, with self-contained instruments and relays, but is usually the light-duty class of equipment, since the interrupting rating of the breakers should not exceed 25,000 or 50,000 kva.

Main switchgear for incoming and primary feeder circuits for the purchased power installation is similar to that for a generating station, except that here the voltage is invariably determined by the power company's transmission system.

Included in the structure may be means for metering. A typical plant has two incoming circuits and two or more primary plant feeders. A metering compartment between incoming and outgoing groups of circuits houses the instrument transformers, and the necessary meters are mounted on the front panels.

We have mentioned interrupting capacity only briefly. This point is of utmost importance, and is often given too little consideration, particularly where an addition to an existing installation is being made. Such an extension may require breakers of rating far beyond the original need. Possibly a bus and circuit arrangement, such as a synchronizing bus, will permit the use of the original breakers. In any case, the most careful consideration should be given to interrupting capacity requirements if continuity of service is to be maintained.

In a recent case, it was found that breakers of 25,000 kva. rating had been originally installed, and additions of the same capacity has beeen made several times, without considering the increased duty. At the time of the study, breakers of 250,000-kva. rating were shown to be required on the bus, on which 25,000-kva. breakers were actually in service.

Maurice Hill Hobbs, born in 1892 in Yorkville, Ill., was graduated in 1913 from the University of Kansas with his B.S. in electrical engineering. Worked for the Montana Power Company doing construction and station operating. Served for one year in the United States Signal Corps. Joined Westinghouse at East Pittsburgh in 1922 as a design engineer in the switchgear division. Named manager of the switchboard engineering department in 1936. For recreation, his main interest is baseball, although he plays golf for exercise, and takes motion pictures for relaxation

Save Space and Cost

Where additions or changes are to be made in existing structures, the use of metal-clad switchgear for replacement or expansion will be found to save both space and installation cost. Frequently increased interrupting capacity breakers may be installed in the same space as existing breakers of lower rating. Perhaps an increased number of circuits may be installed.

Further reductions in space and installation cost are obtained by the combination of power transformers with their associated switchgear, using factory fabricated interconnections, metal-inclosed. The use of this arrangement has expanded in the past two years, for both industrial and utility installations, and it provides the maximum in factory assembled switchgear for industrial applications. These "unit substations" are made up with the transformer and either the high-tension or low-tension switchgear or both, and can be obtianed in a variety of ratings. Either indoor or outdoor construction is available.

It is in the secondary (usually 440-volt) distribution system that the greatest developments have taken place in the past two years. One development is the low-voltage metal-inclosed unit substation which may be used with either the radial or the network system of distribution, and any modification of them. Whatever the system selected, the units supplying it

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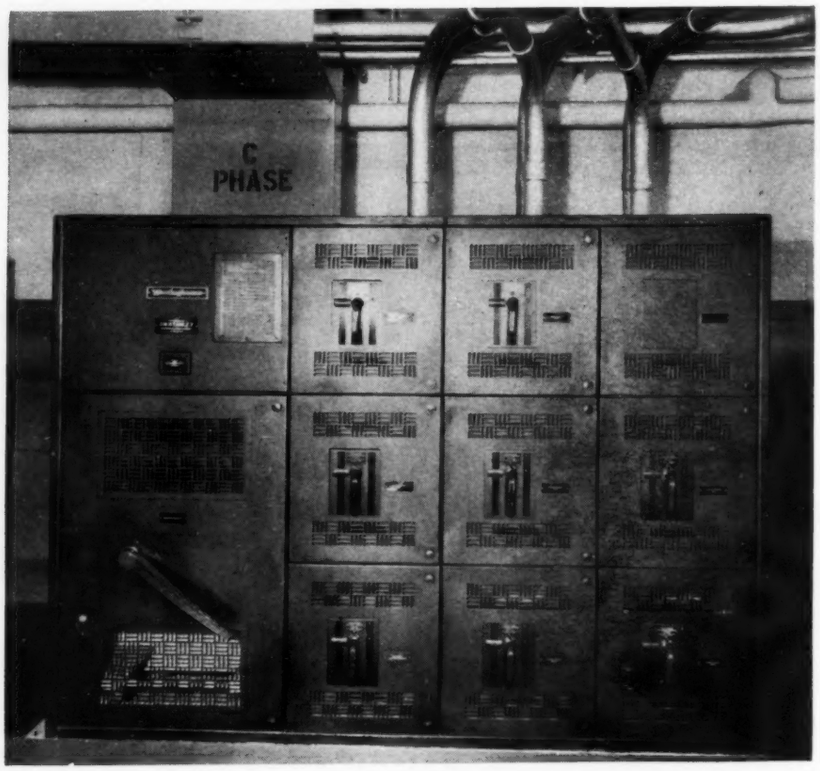
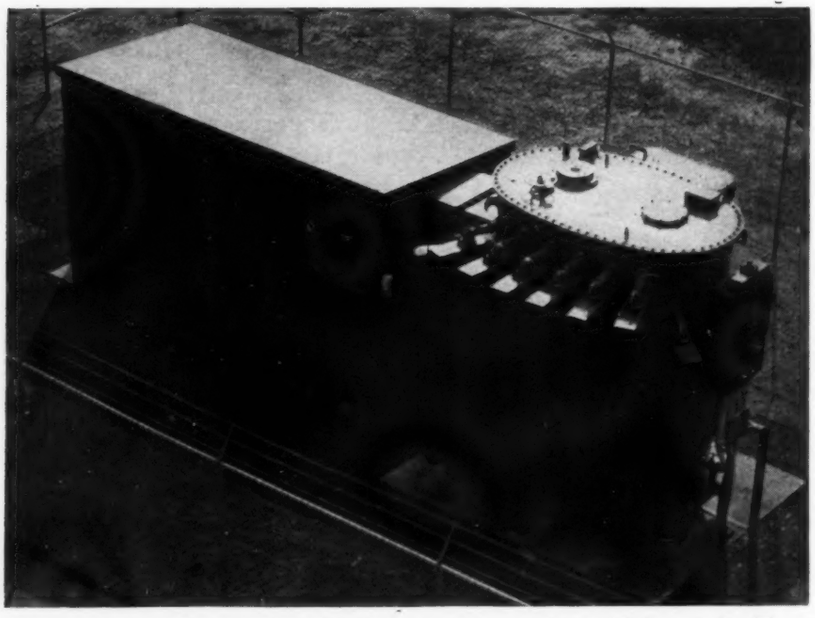
should be relatively small, supplying a certain limited section of the plant by means of short cable runs.

Energy may be carried to the unit substation over high-tension circuits rather than low-tension feeders. This distribution obviously reduces copper losses, improves voltage regulation, and provides greater reliability, particularly in larger installations.

The unit substation for such a system consists of a transformer with a primary disconnecting switch or breaker unit, and a group of low-voltage metal-inclosed switchgear units with breakers that feed the load. These unit substations in turn are fed from high-tension switchgear units at the main substation. Each may have its own incoming high-tension circuit, but the more generally used method is to have several units fed from each circuit. The reliability demanded, and the relative size of the unit substation as compared with the load, determine the number of power centers that may be fed from each primary circuit.



Typical low-voltage metal-clad switchgear with group breaker and provision for nine feeders. Such switchgear can be arranged to handle any desired number of circuits of equal or varying capacities



Indoor and outdoor unit substations are becoming widely used. They supply utilization voltage and switching where they are needed

The most reliable form of secondary distribution system is the network. This system is composed of power centers fed from primary circuits in a similar manner to those of the radial system, except that they are tied to each other by means of secondary loops. This provides the utmost reliability and the best voltage regulation it is possible to obtain. Between the unit substations in the larger installations may be located additional distributing points, which are in every way similar to the unit substations except there are no transformers. These may be part of the original installation, or may be cut into the loop as unforeseen load is added.

Installed in Duplicate

The primary power supply circuits, for highest reliability, are installed in duplicate. This means the use of either two incoming circuit breaker units, or a double-throw disconnecting switch to transfer from one supply to the other.

The secondary loop circuits are fed through limiters, which operate in a similar manner to fuses, except that their rating is so high that they operate for short-circuit protection only. Inclosing compartments for limiters are built as part of the unit substation structure to make a uniform assembly. Each of these limiter compartments contains a load-break switch in addition to the limiters and buses. The purpose of the load-break switch is to de-energize the parallel sections of the loop between adjacent load bus units to permit replacing blown limiters and defective cable. To insure selectivity, two or more cables per phase are required in the loop circuits.

The selection of switchgear for plant distribution systems has become simpler because of the availability of metal-inclosed switchgear, particularly the unit-substation type, and will be even more simple and convenient as the application of these forms of equipment is better understood.

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Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

THE 50TH YEAR OF **HYATT** ROLLER BEARINGS

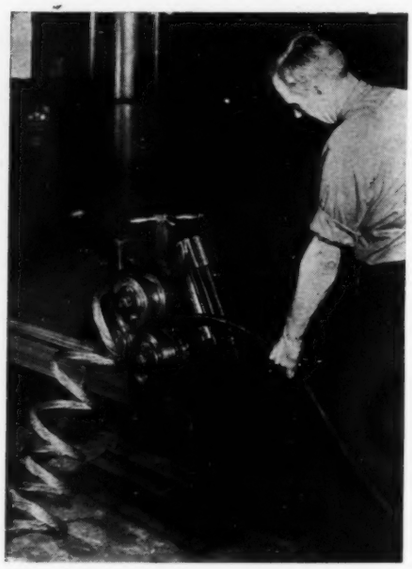
MAINTENANCE SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary maintenance accomplishments. Accepted articles will be paid for

Bending Roll Used to Salvage Rubber

SOURCE—The Timken Roller Bearing Co., Canton, Ohio

Large corporations frequently accumulate sizable quantities of scrap electric cable. Until recently it has been general practice to burn the rubber and cloth insulation off these cables to salvage the copper.



Two wheels are substituted, and the bending roll machine goes to work salvaging badly needed cable rubber —at the rate of 6 feet a minute

Timken, seeking a method of salvaging cable rubber, experimented with a standard bending roll machine. This machine consists of three smooth wheels, two of them in tandem beneath a third wheel which is centered above them. Varying pressures are exerted upon the material to be bent by raising or lowering the upper wheel.

Engineers removed the one of the lower wheels and replaced it with a notched gripper wheel. A sharp center-flanged wheel replaced the upper wheel. No change was made in the third wheel. This conversion proved effective in removing the outer layer of cable cloth insulation, and the inner layer of fine rubber which is so urgently needed at the present time. The gripper wheel feeds the cable between the flanged cutter and the pressure wheel, slicing the cable open and peeling it simultaneously. The cloth cable cover drops away from the rubber leaving the rubber and copper cable in a salable condition.

Cable rubber salvaging is accomplished at the rate of about 6 feet per minute. Cables ranging in size from $\frac{3}{8}$ to 2 inches are easily handled.

This machine is regularly used in connection with the sheet metal department and is converted to salvage use in about three minutes by simply replacing the two regular wheels.

•

Rack Conserves Floor-Cleaning Tools

S. H. COLEMAN, Staunton, Va.

Life expectancy of brooms, floor brushes, and other floor-cleaning tools can be greatly prolonged if these appliances are properly cared for when not actually being used. Such care is especially desirable under present conditions, because sources of many of the straws and bristles formerly used in these tools have been cut off by the war, and available supplies of substitute materials are somewhat limited.

The greatest single factor, other than normal wear, responsible for the deterioration of brooms and floor brushes is the practice of standing them in corners or against walls so that the business ends rest on the floor. This practice has a tendency to bend the straws and bristles, decreasing their efficiency and shortening their life. When the floor is damp or wet, deterioration will be accelerated.

Use of a simple rack such as the one that is illustrated in the drawing on following page will help to prolong the useful life of these tools. Constructed of short sections of pipe whose internal diameter is slightly greater than that of the brush and broom handles,

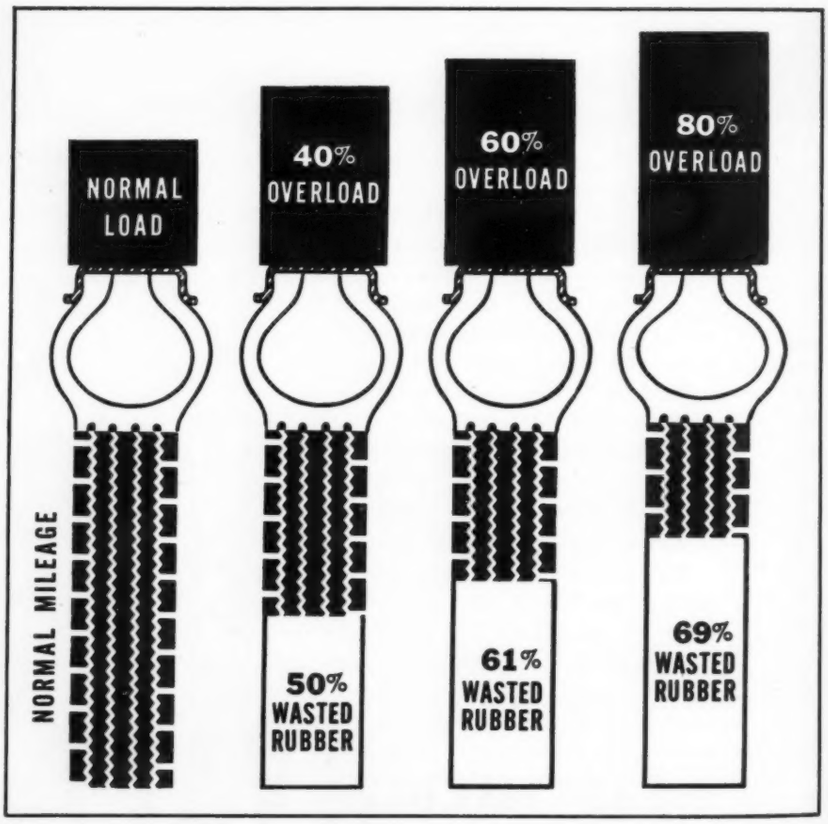
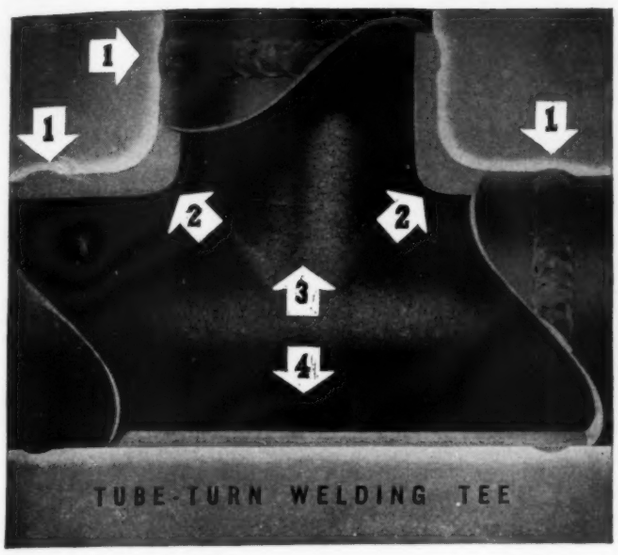
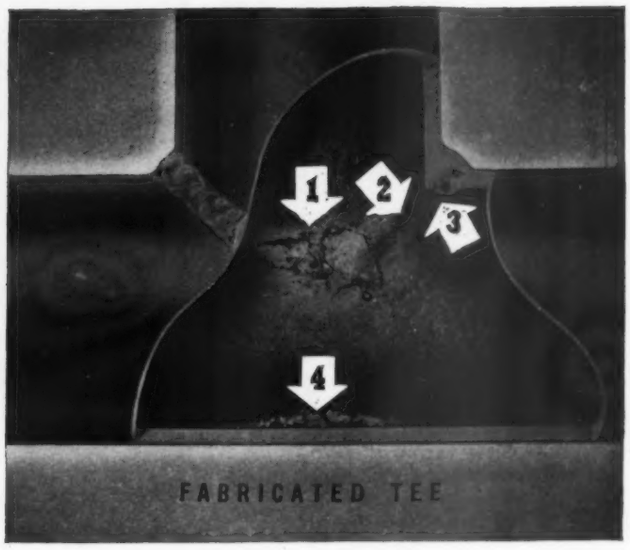


Chart shows how percentage of rubber wasted increases as amount of overload borne by the tires of a truck or bus is increased beyond the rated capacity of the carrier. It is one of many illustrations in a pocket-size booklet on tire conservation published by The Firestone Tire & Rubber Company, Akron

Why TUBE-TURN WELDING TEES provide strong, safe, easy-to-weld branch connections



(1) Easy circumferential butt welds cut installation time, make sounder, safer joints. (2) Easy sweeping curves reduce friction and pressure loss to a minimum. (3) Smooth inside walls assure even flow and add to the long life of the connection. (4) No accumulation of slag.



(1) Joining a branch into a main with an intersection weld makes a weaker, less sound connection. (2) Gaps and irregularities caused by uneven cutting must be filled by welder. (3) Sharp corners and jagged angles are poor piping practices. (4) Possible slag accumulation can impede flow and seriously injure valves.

COMPARE the two cut-away illustrations above point by point for *proof* of the unmistakable superiority of welding tees.

It takes *fewer man-hours and far less trouble* to install a Tube-Turn welding tee into a piping system than to fabricate a branch connection, a vital factor in today's plant expansion and modernization for war needs. Other major advantages of these seamless welding tees are the *greater strength, longer life,* and *smooth flow* secured.

The design and construction of Tube-Turn welding tees *add to the strength of the entire piping system* by reinforcing these crucial points.

8 REASONS FOR SPECIFYING TUBE-TURN WELDING TEES

1 *Extra thickness at crotch* reinforces where highest stress occurs.

2 *Reinforcement along top of run* adds needed strength here.

3 *Reinforcement on sides*—also a point of high stress gradually tapers toward end of outlet and bottom of run.

4 *Longer outlet* permits faster lining up and ample room for rod manipulation.

5 *Ends machined* to exact pipe wall thickness—easy to align and weld.

6 *Increased thickness at bottom* adds to full strength without excess weight.

7 *Smooth inside walls, curved inner crotch and special manufacturing process* assure even flow.

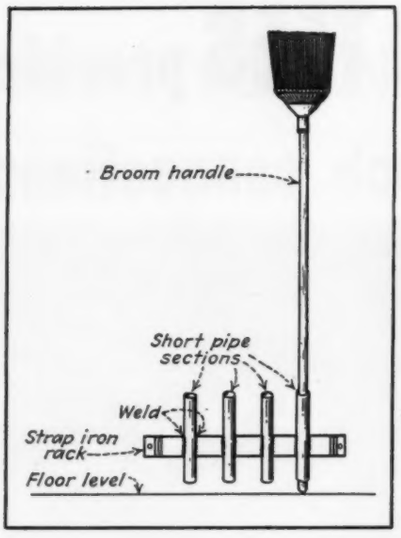
8 *Size, material, thickness and name* identified on permanent name-plate.

Tube Turns manufactures a complete line of welding fittings and forged steel flanges in all standard sizes and weights. Write for new complete catalog and valuable engineering data book No. 111. It's free.

TUBE TURNS, LOUISVILLE, KY.
INCORPORATED

Branch offices: New York, Chicago, Philadelphia, Pittsburgh, Cleveland, Tulsa, Houston, Los Angeles, Washington, D. C. *Distributors in all principal cities.*

TUBE-TURN
TRADE MARK
Welding Fittings



such a rack can be adapted to almost any local condition, simply by shaping the strap iron frame to suit. Of course, pipes must be spaced sufficiently far apart to allow the brushes and brooms to clear one another and to afford sufficient clearance from adjacent walls.

•

Brush Wear Prevents Generation

LIONEL A. HUNT, St. Catherines, Ontario, Canada

Several attempts to get an alternator exciter to pick up were unsuccessful. A thorough check revealed that the brushes were fitted with a copper U-piece across the top and had worn down until the U-piece was striking the bottom of the guide slot in the brush box. This was true with every brush. When the machine was shut down, the commutator cooled off and contracted. Not a single brush was in contact with the commutator so that it was possible to slide a thin piece of paper between any brush and the commutator.

Where brushes are very gummy and in need of cleaning, and the generator has cooled off after a shutdown, the brushes may be suspended off the commutator. The machine will not generate until the brushes are released and reestablish contact with the commutator.

•

Saves $75 by Welding Cracked Cutter

SOURCE—Westinghouse Electric & Manufacturing Company, East Pittsburgh.

With metal-working tools at a premium it is vitally important that broken pieces be repaired, if it is at all possible to do so. The illustration shows a $100 keyway cutter that was repaired at a total cost of $25 by welding.

A crack 0.005 inches wide extended from the keyway to the base of the teeth. To repair, grooves were extended on both sides of the crack and ground ⅛ inch deep. The radius of the groove at the bottom was 10 degrees. The cutter was preheated to 800 degrees Fahrenheit and

welded with 18-8 stainless steel rod, ⅛ inch in diameter.

The cutter was reheated to 800 degrees and allowed to cool slowly in an open-end furnace. It was then hardened by heating to 2300 degrees Fahrenheit, followed by cooling in an air blast.

•

When Steel Pipe Must Go Underground

S. H. SLEMAN, New York

Critical shortages of piping materials frequently necessitate substitutions. An industrial plant found it desirable to install an underground water main to serve several fire hydrants. New pipe could not be obtained. As a temporary expedient it was decided to use second-hand black steel piping and to protect it against too-rapid deterioration with corrosion-resistant coverings applied both externally and internally. The method of securing this protection follows:

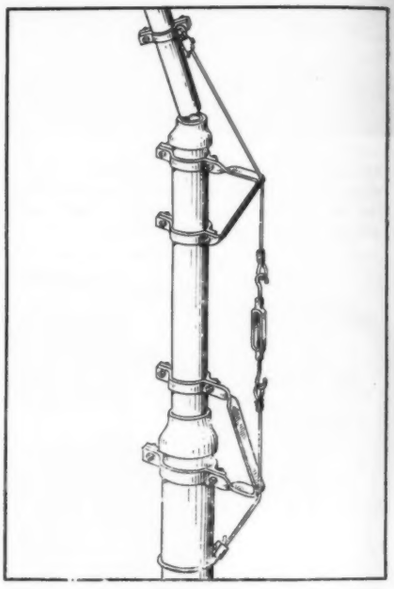
First, all surfaces of the pipe were thoroughly wire brushed to remove all rust and scale. A coat of portland cement water mixture was then applied to the interior surfaces, using a rotary brush. Externally the pipe was given a coat of hot asphalt compound. Over this coat was placed a spirally wound coat of cheesecloth followed by a finish coat of the hot compound. The exterior surface was left bare far enough behind the threads to permit the use of installation wrenches. After installation, the exposed ends and joints were given the compound, wrapping treatment.

•

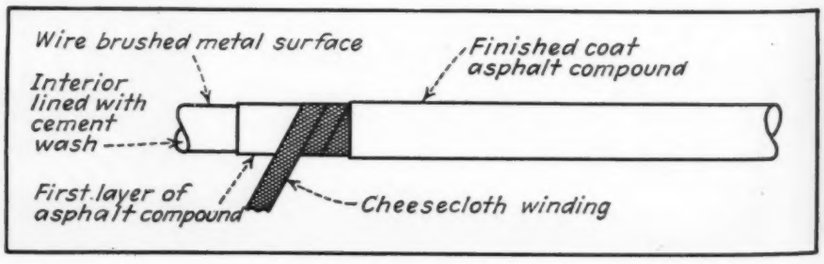
Electric Line Pole Self-Guyed and Braced

GEORGE HOLMAN, Marissa, Ill.

An electric line pole made of sections of 8-, 6-, and 4-in. pipe connected by reducers, rusted through and broke almost off where the 4-in. pipe screwed into the top reducer. This pole, set at the apex of an obtuse angle formed by the line, could not be guyed in the normal



manner because of railroad yards. It carried eighteen heavy wires. Bare spots where the insulation had deteriorated made setting a new pole risky. Service over the wires had been restored and further interruption had to be avoided. To get around this, repair was carried out, as shown in the sketch, by bringing the top section back into place with braces, guy rope, and turnbuckle. The break was brazed, and the guy and braces left to strengthen the pole.


Wire brushed metal surface
Finished coat asphalt compound
Interior lined with cement wash
First layer of asphalt compound
Cheesecloth winding

Blocking

THE INVISIBLE SABOTEUR!

ERRORS that could be prevented . . . operations that could be speeded up . . . methods that could be improved . . . all of these and others accomplish the ends of the saboteur even if they are unintentional.

Frequently engineers and executives are amazed by the timesaving applications that can be made with modern scales. For modern scales are *much more* than better weighing instruments. They count small parts. They weigh materials and commodities in motion. They read and keep books, making PRINTED RECORDS, much faster and with *unfailing accuracy* impossible for human eyes and hands.

Use your priority to get Fairbanks weighing equipment that will block the invisible saboteur in your plant, *now* — and make money for you in years to come. Fairbanks scale engineers are ready to help you. Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Illinois.

FAIRBANKS-MORSE FAIRBANKS SCALES

SCALES
DIESELS
MOTORS
PUMPS

D. C. Motor Troubles and Remedies

P. D. ROSS, Motor Division, General Electric Company

To ASSIST IN DIAGNOSING TROUBLE that may occur with d.c. motors, a table of symptoms, causes, and remedies is given below. In most cases, trouble can be remedied on the job, although it may be advisable to call for a competent motor service man. In other instances, it may be desirable to send the motor to a well-equipped service shop for thorough repair.

SYMPTOM: Motor will not start

Cause:	Remedy:
Open circuit	Check voltage at every terminal Check control for open starting resistor, open switch, burned fuse Check conduit box for loose terminal connection.
Bearing frozen	Replace bearing and recondition shaft
Overload	Reduce load or use larger motor
Excessive friction	Straighten or replace bent or sprung shaft Check airgap clearance to be sure that rotor is free to turn

SYMPTOM: Motor stops after running short time

Cause:	Remedy:
Power failure	Check voltage at the motor terminals Check fuses and overload relay
Overload	Reduce load

SYMPTOM: Motor attempts to start but overload relay operates

Cause:	Remedy:
Motor being started with weak or no field	If adjustable-speed motor, check field rheostat for open resistor Check wiring for loose or broken connection Check field coils for open winding Be sure full field current is applied
Motor has insufficient torque to drive load	Use larger motor or one with characteristic to match load

SYMPTOM: Motor runs too slowly

Cause:	Remedy:
Line voltage too low	Check voltage at motor terminals and raise to correspond to nameplate rating (motor should operate satisfactorily if voltage is within plus or minus 10 percent nameplate rating)
Short circuit in armature	Check commutator and remove any metallic particles between segments Check for short between adjacent commutator risers Test for internal shorts in armature and repair
Heavy overload or excessive friction	Check to see that load does not exceed nameplate rating of motor

SYMPTOM: Motor runs too fast

Cause:	Remedy:
Resistance in field circuit too high	Use rheostat with lower resistance or arrange rheostat with suitable stop so that too much resistance cannot be inserted in field circuit
Line voltage too high	Correct high voltage
Incorrect brush setting	Set brushes on neutral
Poor connection in field circuit	Clean and tighten all connections
High resistance contacts on rheostat	Clean rheostat contacts and adjust slide arm for correct pressure
Load too light for series-wound motor	Use smaller motor

SYMPTOM: Excess noise

Cause:	Remedy:
Armature rubs on pole piece	Check bearings for wear and replace if necessary Tighten pole bolts
Armature out of balance	Re-balance
Loose screws, bolts, or connections	Tighten
Clicking or singing of brushes	Adjust brushes in holder Check for wrong size and type of brush

(*Continued on page 148*)

THE MISSING MAN

Illness costs America one week's production every year!

EVERY DAY, one million American workers are home ill. This average figure is based on reports of the U. S. Public Health Service.

What's more, over half of these absences are due to the common cold and its complications, other authorities state.

How can this tremendous loss of manpower be reduced? Here's one answer: absences were cut in 92% of the companies which established health programs, as shown in the Industrial Health Practices survey of the National Association of Manufacturers. Through personal hygiene... soap, hot water, individual tissue towels . . . the spread of common contagions is discouraged.

If you are now providing ScotTissue towels, here is another way —and a very vital way—to help. Encourage your employees to prevent the waste of towels. Then more can be made available to other workers.

Join the Scott WAR ON WASTE

The Scott Washroom Advisory Service offers help in reducing towel waste. Its colorful posters remind workers that *one* towel will dry thoroughly. In fact, a single "Soft-Tuff" towel can drink up twice the water normally left on hands after washing. And it has ten times more rub strength than previous ScotTissue towels.

Savings up to 30% have already been demonstrated in certain cases. Other washroom economies are also possible in many instances, with an actual improvement in hygiene and comfort.

For details, write Scott Paper Co., Chester, Pa.

"SOFT-TUFF" **Scot Tissue** TOWELS

Stay Tough When Wet

Trade Marks "ScotTissue," "Soft-Tuff," "Washroom Advisory Service" Reg. U. S. Pat. Off.

D.C. Motor Troubles and Remedies (*Continued from page 146*)

	Use brush with correct top and face angle
Humming as armature teeth pass pole pieces	Chamfer pole tips so that armature teeth pass tips at an angle
Motor loose on foundation or rails	Tighten holddown bolts
Load is noisy	Check driven load
Ball bearings worn or broken	Check bearings

SYMPTOM: General sparking at brushes

Cause:	Remedy:
Eccentric or rough commutator face	Grind and true commutator surface
High commutator bar	True commutator
Loose commutator bar	Tighten commutator bolts and true commutator
Excessive vibration of rotor and brush holders	Balance armature
Broken or sluggish acting brush-holder spring	Clean or replace spring and adjust pressure to manufacturers' recommendations
Brushes too short	Replace brushes
Machine overloaded	Reduce load
High commutator mica	Undercut mica

SYMPTOM: Sparking at light loads and a gummy appearing commutator

Cause:	Remedy:
Paint spray or oil vapors	Use inclosed motor or eliminate source of oil and paint spray
	Use abrasive brushes
	Clean commutator

SYMPTOM: Sparking at light loads

Cause:	Remedy:
Brushes off neutral	Adjust brushes

SYMPTOM: Erratic commutation and fluctuating speed with constant load

Cause:	Remedy:
High resistance commutator film resulting from operation in corrosive or damp atmosphere	Separately ventilate machine, using pure air
	Replace with inclosed motor
	Use abrasive brushes
	Clean commutator

SYMPTOM: Grooving of commutator

Cause:	Remedy:
Brushes not staggered	Stagger brushes

SYMPTOM: Brushes wear rapidly

Cause:	Remedy:
Rough commutator	Have commutator ground
Brushes too soft	Use correct brush

SYMPTOM: Armature overheats

Cause:	Remedy:
Motor overloaded	Reduce load to correspond to nameplate rating
Motor installed with restricted ventilation	Arrange for free circulation of air around motor
Armature winding shorted	Check commutator and remove any metallic particles between segments
	Test for internal shorts

SYMPTOM: Field coils overheat, one coil cold

Cause:	Remedy:
Short circuit in cold coil overheating others	Replace coil that is cold

SYMPTOM: Commutator overheats

Cause:	Remedy:
Brushes off neutral	Adjust brushes
Excess spring pressure on brushes	Decrease spring pressure
Brushes too soft	Use correct grade of brush

SYMPTOM: Bearings hot (sleeve)

Cause:	Remedy:
Oil ring or rings stuck	Free rings
Poor alignment	Re-align motor with load
Too much side pull of belt	Reduce pull or use outboard bearings
Bearing worn	Replace bearing
Lack of lubrication	Replenish oil
Oil thick in cold weather	Use cold test oil
Oil dirty	Flush and replace

SYMPTOM: Bearings hot (ball)

Cause:	Remedy:
Poor alignment	Re-align
Too much side loading	Reduce sideloading or use outboard bearing
Too much grease	Remove excess grease
Too much end thrust	Reduce end thrust or use external thrust bearing
Heat from driven machine travels through shaft to bearing	Use bearing suitable for high temperature or use radiating disk on motor shaft
Broken ball	Replace bearing
No grease, or worn, hard grease	Inject grease or clean and repack

IT'S "JUNK" TO YOU••• — There's a harvest of scrap in your plant—obsolete dies, jigs, patterns and moulds; idle water tanks and their supports; scraps of rods, bars and other steel shapes . . . It's "junk" to you. But, it means Victory to America. Every pound of scrap brought back into the market boosts production of tanks, guns, planes and ships. You can launch your own salvage campaign without waiting for a community drive. Delegate one man to find every article of doubtful use around your plant and give him the authority to do a real salvage job. Get in the scrap . . . and do it now. ALAN WOOD STEEL COMPANY, Conshohocken, Pa.

PARACHUTES for air-borne invasion . . .

Carrying the attack to the enemy . . .

It's the goal of American Industry to train and equip more paratroopers than the Axis ever dreamed of—and that goal will be achieved.

It calls for new plants to produce the synthetic fibres needed in such tremendous quantity . . . plant conversion to meet many of the production problems involved.

In every war plant, heating is a vital consideration . . . for proper heat is essential to maximum output.

For 50 years, steam has proved its ability to provide steady, even, economical heat in buildings of every type.

Steam, harnessed and brought under control with Webster Systems of Steam Heating, has been used successfully in more than 75,000 buildings.

Today, we are engaged in direct war work but manufacturing facilities are still available to supply Webster Steam Heating Equipment for buildings serving the war effort.

Essential repairs for Webster Systems are available on A-10 priority, under W.P.B. Emergency Repair Order P-84. Orders should be limited to actual needs.

Warren Webster & Company, Camden, N. J.
Representatives in 60 principal Cities

Webster
Steam Heating

YOU WANT TO KNOW

more about the items mentioned on this page

Letters to the addresses given will bring information

• FOR YOUR OWN GOOD and for the GOOD of US ALL—is the title of a 58-page booklet that shows causes of industrial accidents and suggests ways of preventing them. Accident figures are translated into what the lost man-hours *could* have built in battleships, destroyers, submarines, or planes. Last page of booklet is pledge, to be signed by employee. Revere Copper & Brass, Inc., Rome, N. Y.

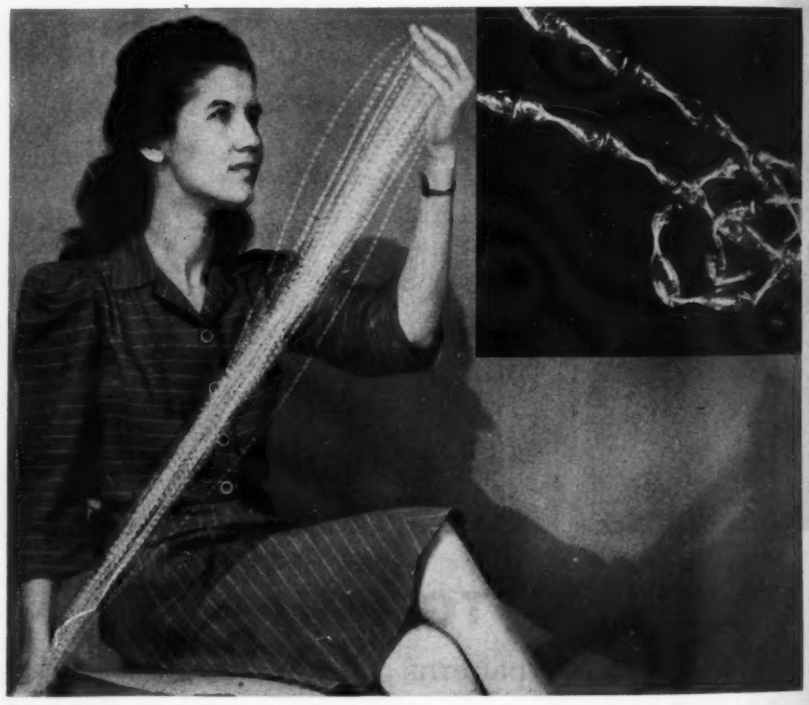
• TWENTY-THREE WAYS to Conserve the Life of Your Multiple V-Belt Drives gives simple recommendations that will help to increase the life of V-belts. Printed in three colors, with uncomplicated illustrations, directions are easy to follow, and show just how to eliminate the causes that reduce belt life. Multiple V-Belt Drive Assn., 140 S. Dearborn St., Chicago.

• FOREMANSHIP TRAINING FOR VICTORY. To help foremen put the most into, and get the most out of, their jobs, twelve small books have recently been published as part of a home study course. Each book discusses a different phase of foremanship, in easy-to-read language. For plants where several men study the same course together, a manual is included for the use and guidance of the group leader. War Production Training Division, La Salle Extension University, Chicago.

• EMPLOYEE TRANSPORTATION. Eight-page booklet published by the Department of Logistics, International Business Machines Corp., 590 Madison Ave., New York, shows how to set up employee transportation plan, including forms for questionnaires, maps, and surveys, and indicates method of forecasting how much longer existing forms of transportation—especially regarding tires on workers' cars—can be expected to last.

• KEEP 'EM ROLLING. Booklet describes highlights of a 25-min. motion picture showing the importance of rubber in the nation's war effort. Includes three self-addressed request cards for the film, which may be obtained for showing before any organized group. The B. F. Goodrich Co., Akron.

• SCRAP, AND HOW TO COLLECT IT. What scrap is, where to look for it, how to prepare it for collection, organization of the conservation division of the



HUNDREDS of potential uses are foreseen for a new product known as Bubblfil—a string of cellophane bubbles filled with air. Buoyant as imported kapok, resilient as sponge rubber, wartime possibilities include its use for life-preserver filling, padding for airplanes or tanks. Another Bubblfil characteristic is its low thermal conductivity, which, together with its light weight, makes it a fine insulating material, the manufacturers claim. E. I. du Pont de Nemours & Co., Wilmington, Del.

Tougher Steel...Bigger "Bites"...Faster Production

SUN LUBRICANT Saves Two Operations

Cuts Passes on Manganese Steel From Six to Four!

"Battle bonnets" — helmets that stop a high powered rifle bullet at six feet . . . weigh much less . . . provide greater overall protection . . . that's the kind of equipment our boys are getting today and faster than ever thanks to the aid of Sun Lubricants.

A few years ago cold rolling manganese steel from .093" to .0375" with another oil required six passes. Today, using Sun Lubricants as roll oils, this steel is rolled in only four passes . . . with a better finish, free from soft spots and is produced faster and more economically.

The same service . . . products . . . and research that are constantly making advances like this possible are available to you in your plant. Today, tomorrow, or whenever you need engineering advice or aid in applying the right petroleum product in the right place call in a Sun Oil Company Engineer — one of those Doctors of Industry. Let him show you the possibilities of more production through better lubrication. Write . . .

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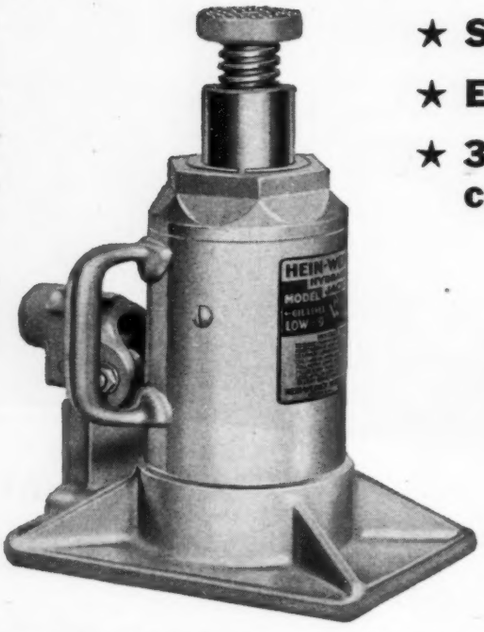
SUN PETROLEUM PRODUCTS.. HELPING INDUSTRY HELP AMERICA

Have YOU thought about how many war production jobs you could speed up by using

HEIN-WERNER
HYDRAULIC JACKS



★ **Super-Powerful**

★ **Easy-Operating**

★ **3 to 30 tons capacity**

Time *is* a factor in filling government orders, and many times the solution to licking a problem can be solved by "unusual" methods.

For example, should your factory lack certain machines for war production work, it is quite possible that jobs can be done with the aid of Hein-Werner Hydraulic Jacks . . . These super-powerful, easy-operating jacks are especially suitable on jobs involving lifting, pressing, bending, etc.

Complete H-W line includes hydraulic jacks of 3, 5, 8, 12, 20 and 30 tons capacity . . . For details—consult your nearest industrial supply distributor—or write us . . . Quick delivery can be made on orders carrying priority rating.

HEIN-WERNER MOTOR PARTS CORP.
Waukesha, Wisconsin

HEIN-WERNER
HYDRAULIC JACKS
Are Built Right and Priced Right

War Production Board, and how the state general salvage organization functions are all explained in booklet published by American Industries Salvage Committee, New York, for free distribution.

• SAFE CRANE OPERATION. Manual on safe standard practices contains rules for guidance of crane operators and hookers-on and for men working in the crane operating area. Colored posters display standard set of crane signals found to be most satisfactory under actual operating conditions. The Whiting Corp., 157th St. & Lathrop Ave., Harvey, Ill.

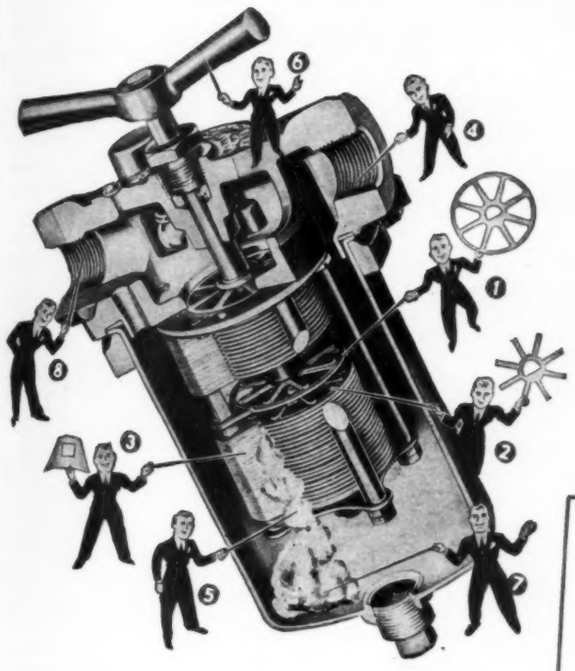
PACKAGED PARTITIONS. Workman slips prefabricated wood moldings between glass blocks—and presto, there's a new partition. Ridged faces on wood strips interlock with flutings on edges of blocks. Matched ends of vertical molding interlock with horizontal moldings. Wood wedges at the end of the course lock the complete panel firmly in place. And the whole thing comes in a package. Insulux Division, Owens-Illinois Glass Co., Toledo

• WARTIME STRIKES IN AMERICAN INDUSTRY—Sixteen-page pamphlet shows trends of strikes since Pearl Harbor, lists them, discusses causes, gives data about strikes in war plants. The National Association of Manufacturers, 14 West 49th St., New York.

• LESSONS IN GRINDING. Four apprentice training motion pictures, entitled "Cutter Sharpening," "The Cylindrical Grinder," "The Surface Grinder," and "Grinding Wheel, Care and Use." Intended to present the fundamentals of grinding so that an inexperienced man can understand them. Norton Co., Worcester, Mass.

• PAINT remover said to be absolutely non-inflammable, fast-acting, and wax-free can be used with safety near welding machines, electrical apparatus, grinding wheels, and other equipment generating heat and sparks according to the manufacturer, Turco Products, Inc., Department of Public Relations, 6135 South Central Ave., Los Angeles. Applicable with brush or spray to metal, wood, and other fine surfaces. After-cleaning is unnecessary.

CUNO AUTO-KLEAN FILTER



1. Cleanable (manually or automatically) without interrupting fluid flow.
2. Non-collapsible, all-metal construction.
3. Minimum pressure drop.
4. Permanent filter element — no cartridge to replace.
5. Obviates duplex installation.
6. Cleaned by *combing*, not scraping.
7. Minimum filter maintenance.

Made of any machinable metal in a wide range of sizes — small compact units up to massive motor-driven models — to handle fluid, air, gas.

NO STOPS
for cleaning fluid
NO STOPS
for cleaning filter

1. Wheel-shaped discs are stacked on a central rotatable shaft.
2. Discs are held apart by spacers conforming in shape to discs but without rim.
3. Cleaner blades stacked on stationary rod extend into slots between discs.
4. Fluid containing solids enters casing here . . . must pass between discs.
5. Solids larger than space between discs are retained on outer edges.
6. Turning handle by hand or motor causes discs to rotate past stationary cleaner blades.
7. Rejected solids fall to bottom of sump . . . drained when convenient.
8. Filtered fluid passes out here.

Guarding against foreign solids on these services is a job Cuno Filters handle at less maintenance cost, more dependably and over longer life

Acids
Adhesives
Air
Alkali
Animal Oils
Boiler Feed
Casein
Cleaning Solutions
Coatings
Compressed Air
Coolants
Cutting Oils
Dip Tank Systems
Enamel
Engine Fuel
Engine Lubricating Oil
Fuel Oil
Fuel Tar
Gases
Gasoline
Grease
Grinder Coolant
Hydraulic Oil
Ink
Japan
Lacquer
Lubricating Oil
Machine Tool Cutting Oil
Machine Tool Hydraulic Oil
Machine Tool Lubricating Oil
Nitrocellulose Solutions
Oils
Paint
Palm Oil
Paste
Pyroxylin
Quenching Oil
Resins
Rust Proofing Compounds
Sizing
Solvents
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Varnish
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Washing Compounds
Water
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Install

JOHNSON

Leaded Bronze

BEARINGS

How many "lazy" motors in your shop? Before you blame the equipment . . . check up on the bearings. In order to get maximum power from each unit, it is necessary to install bearings that are designed to *assist* the motor . . . not retard it.

Johnson *Leaded Bronze* Bearings enable you to get the most from your motors. A special high lead bronze alloy . . . plus correct design . . . correct tolerances . . . gives you the long life, the smooth operation and the power you have a right to expect.

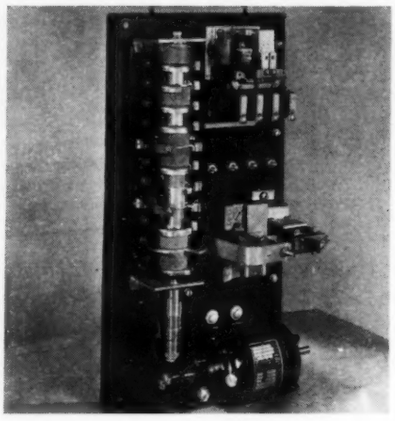
Johnson Electric Motor Bearings are available from stock for more than 250 individual types of motors. Twenty-two warehouses plus hundreds of distributors are able to give you excellent delivery. A request, on your business letterhead, will bring a copy of our new, completely illustrated catalogue.

JOHNSON BRONZE
512 SOUTH MILL STREET
NEW CASTLE, PA.

WHAT'S NEW IN EQUIPMENT

Synchromatic Relay

A field-application relay that makes satisfactory synchronous motor starting, consists of two elements—one speed responsive, and the other time responsive. Speed responsive element is a current relay and time responsive element is a rotary drum

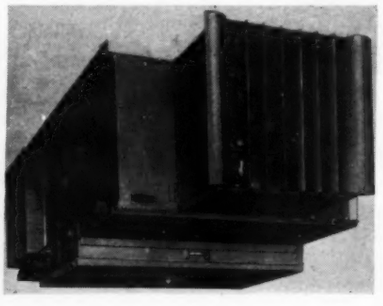


switch. Both elements are simple and need no critical adjustments. The synchromatic relay meets six basic requirements for synchronous motor control: (1) Maximum nonsynchronous speed attained before field application; (2) minimum power required because synchronizing is never attempted before maximum speed is attained: (3) synchronizes in minimum time consistent with maximum speed; (4) positive synchronizing sequence; (5) minimum line disturbance because of favorable rotor position; and (6) automatic pullout protection. Relay is designed either for panel mounting or modern dead front, metal inclosed control structure. Westinghouse Elec. & Mfg. Co., East Pittsburgh.

Humidifiers

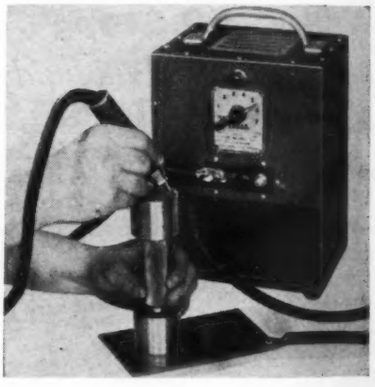
Humidifier provides automatically controlled humidified air-cooling by evaporation; tempering, cleaning, and uniform circulation. Connection to outdoors provides ventilation.

Features claimed include suitability to plant of any size, since humidifier may be installed singly or in multiples. Requires no floor space, uses no distribution ducts, and is easily installed and moved to meet plant changes. Can be installed with no interruption to production. All parts are easily accessible. Drip pan on ball-bearing rollers moves on a track, permitting complete access to the interior of the unit and humidifying packs from the bottom. Air outlet is hinged to swing aside, providing an opening to the fan and fan motor. Carrier Corp., Syracuse, N. Y.



Metal Etcher

Electric etcher permanently marks anything made of steel, iron, or their alloys. Hi-Lo taps and a seven point switch give 14 etching heats between 115 to 1300 watts. A red lamp on front of etcher indicates when power is on and burns brighter as each higher heat is used. Depth



of mark can also be controlled by speed of writing. A ground clamp is provided for etching large, heavy parts and castings.

The etching tool has special heat radiating fins and an alloy tip point. Secondary cables have asbestos covering, work plate is 4x7 inches with ground clamp attachment, 115 volt, 50-60 cycle standard—other voltages and frequencies are available. Maximum rating 1300 volt amperes. Ideal Commutator Dresser Co., 1416 Park Ave., Sycamore, Ill.

Wood Light Arresters

Peerless tempered pressed-wood light arresters and roller housings look like steel and have proved efficient, it is claimed. Light arresters form a continuous trough around a window, prevent light from escaping at the top, sides, or bottom of the shade. Keep the shade from blowing and are effective

Balance

MAKES A DIFFERENCE HERE

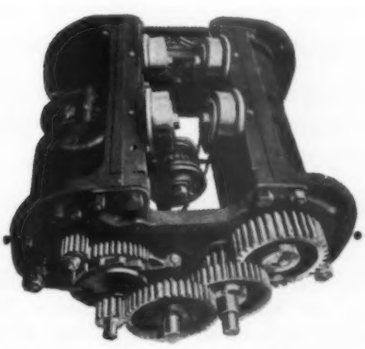
AMERICAN ENGINEERING COMPANY

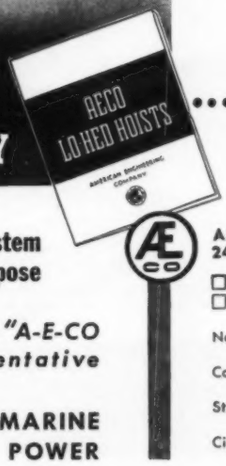
BALANCE makes a difference in electric hoists

It is a fact that balance makes a startling difference in electric hoist design.

The Lo-Hed hoist is unusual in that its motor and drum are balanced around the beam. Take a look with us and you'll see what this does. It means that the hook can be pulled up close to the beam—a desirable plus feature for which you pay no premium. It means that since motor and drum are parallel they can be connected through a train of efficient spur gears. The drum, motor and gearing are housed by easily removable covers.

Lo-Hed hoists have many other service and safety features, shown in the 28-page Lo-Hed catalog. No point of manufacture is more vital to you today than the precision with which Lo-Heds are built. Although production has been stepped up, Lo-Heds are as painstakingly made now as they were before the war. On past experience that means good service from a Lo-Hed years after we win. So get a Lo-Hed. Send for that illustrated catalog we mentioned today.





The Lo-Hed Hoist Is Applicable To Any Monorail System
There's A Balanced Lo-Hed Electric Hoist For Every Purpose

•

Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative

•

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

AMERICAN ENGINEERING COMPANY
2426 Aramingo Avenue, Philadelphia, Penna.

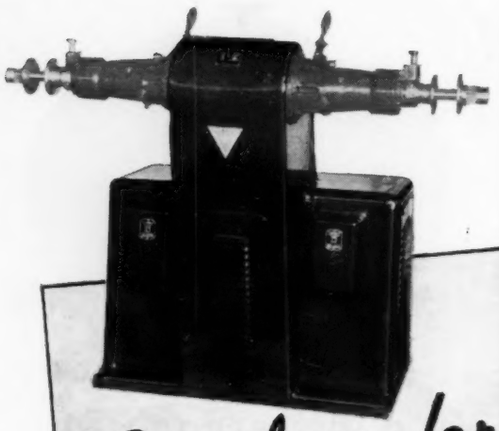
☐ Please send me your complete catalog of LO-HED HOISTS
☐ Ask your representative to get in touch with me promptly

Name _____

Company _____

Street Address _____

City _____ State _____
(Please Print Plainly)



Speed up for Victory!

KIRK & BLUM FACILITIES *are at your disposal*

No need to expand your present plant to handle war production contracts . . . Here's a perfect set-up for you.

We are completely equipped with "up to the minute" facilities for fabricating sheet steel and light plate work . . . and we do it in a craftsman-like manner.

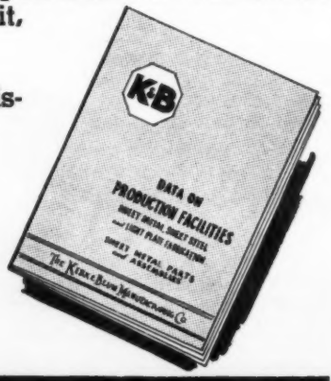
No headaches or worries as to what it will be like when finished. It must be right and it will be right.

We have the organization, with a background of doing good jobs in sheet metal fabrication for over 35 years.

Our Engineers can interpret what you want . . . our skilled mechanics know how to produce it, quickly and accurately.

If you need action and want satisfaction, consult Kirk & Blum.

Capacity 3/8" and lighter, specializing in sheet steel, stainless (all types) monel or other alloy sheet and plate.



Send for this booklet—

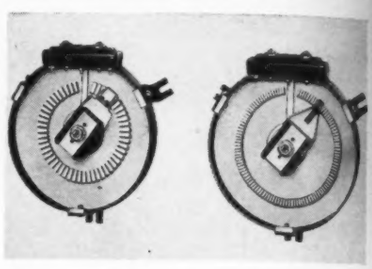
THE KIRK & BLUM MANUFACTURING CO.
AN ORGANIZATION OF ENGINEERS AND MECHANICS
2835 SPRING GROVE AVE. CINCINNATI, OHIO

in holding it against the impact of flying glass. Roller housing keeps light from escaping around the shade roller. Front is curved pressed wood and can be removed to give access to the shade roller. Channels and roller housing can be used with any size and type of window or skylight, and can be installed either inside or outside the casing. Finished in attractive taupe enamel. Beckler-Cardy Co., 1632 Indiana Ave., Chicago.

Rheostats

Pressed steel rheostats with solid rectangular contacts provide a fine degree of control, smooth operation, and certain economies where interpolating rheostats would otherwise be required, it is claimed.

Small rectangular contacts can be furnished on 13-in. or smaller rheostats. Large rectangular contacts can be furnished on 8-in. or larger rheostats. Available with complete inclosures, fittings for conduit connections, motor drives, and with accessories for floor, back-of-board, and concentric mounting. Fixed and adjustable stops to protect control equipment can be provided. Ward Leonard Electric Co., Mount Vernon, N. Y.



Starting Fixtures

Fluorescent lighting fixture that employs a method of ballasting to give positive, instantaneous starting is announced. Lamps come on fully at the turn of the switch. Features claimed are positive starting at lower atmospheric temperatures and lower voltage, no radio interference, and satisfactory tube life. Available for all applications, continuous or separate units, close to ceiling or suspended mounting, open reflector or louvered models. R & W Wiley, Inc., 777 Hertel Ave., Buffalo.

Solder Pots

Small-capacity solder pots are being manufactured for continuous operation where individual soldering melting pots are desired. They are sturdily constructed, consisting of a cast iron pot mounted, by a

Call Scully for

NATIONAL EMERGENCY ALLOY STEELS

TO save critical materials such as nickel and chromium, "National Emergency Alloy Steels" have been developed as substitutes for the old style alloy steels. These new alloy steels cover a wide range of properties and were especially designed to meet present conditions. Many of them are actually out-performing the steels previously used.

Our stock of these "National Emergency Alloy Steels" is now coming in. We welcome your inquiries and orders and would be happy to assist you in determining the grades best suited to your needs.

Telephone, wire or write the Scully Warehouse nearest you—see phone and teletype numbers above.

Do you lack steel to complete a rush war job? Is your production in danger of being slowed down or stopped for want of some piece of steel or steel product? Then call the nearest Scully warehouse. Many such calls have kept wheels turning. If we don't have what you need, you can be sure that we'll do everything possible to help you get it.

Our first job, like yours, is to speed war production. Every one of our warehouses is on the job day and night. And although our stocks of steel are not what we wish they were, what we have can be yours in a hurry—subject, of course, to priority restrictions. So try Scully—note our phone and teletype numbers above.

Scully Service

USS

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel and Steel Products

Warehouses at CHICAGO · NEWARK, N. J. · ST. LOUIS · BOSTON
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UNITED STATES STEEL

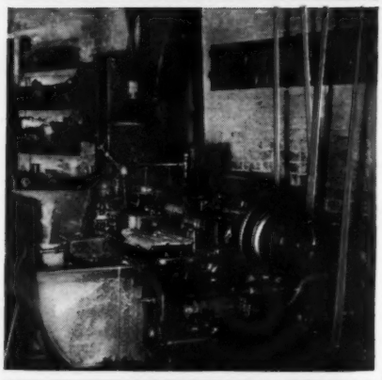
TANNATE LEATHER BELTING GETS EXTRA PRODUCTION FROM ALMOST ANY PLANT—

Tannate carries full load — grips tightly, runs smoothly, keeps machines producing at full capacity even under varying load conditions. It has stamina for 2- and 3-shift daily operation, too — without letdown for maintenance. Gives you

MORE UNIFORM WORK—LESS SPOILAGE—FEWER SHUTDOWNS!

Tannate has high overload capacity, and much greater strength than most oak belting. And, even when exposed to high temperatures, water, machine oils and many weak chemicals, Tannate retains its unusual strength and grip. For primary drives — for modern group drives — for pivoted motor base drives — try Tannate!

Here's one good way to boost the capacity of those you have!



STEP UP PRODUCTION WITH RHOADS *Tannate* WATERSHED LEATHER BELTING

J. E. RHOADS & SONS
ESTABLISHED 1702
35 North Sixth Street, Philadelphia, Pa.
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single screw, on a plated steel stand. Single heat, porcelain nickel-chrome heating element, which can be replaced when necessary, heats the pot. Available in two sizes (Model No. 200—1¾-pound capacity and Model No. 250—2-pound capacity) for operation on 110-volt, a.c. or d.c. Six-foot cord and attachment plug are furnished. Lectrohm, Inc., 5125 W. 25th St., Cicero, Ill.

Prefinished Wall Panels

Chevron Board, low-cost, smooth, plastic-coated wallboard is available in large wall-size sheets and requires no on-the-site finishing, it is claimed.

Available in sizes up to 4x8 feet, panels

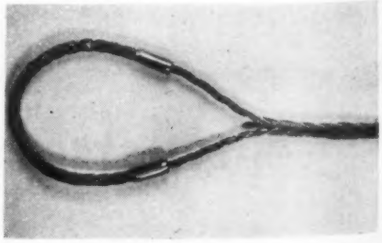
come in three designs—tile board, unscored sheets, and streamlined—and in pastel tones. Plastic finish is permanently bonded to the compressed wood fiber base at the factory. Will not warp, chip, craze, crack, or peel. Panels are quickly and easily installed, even by untrained workers, by nailing, screwing, or cementing to the old walls or new framing. Barclay Manufacturing Co., Inc., 385 Gerard Ave., New York.

Meters

Three small laboratory-type portable electrical-measuring instruments — voltmeter, ammeter, and wattmeter, Model 77-P, are mounted in mahogany cases. Electrodynamometer movements; scale length 3½ inches; accuracy 1 percent. Provide dependable working standards. Niagara Electrical Instrument Co., 1 W. Genesee St., Buffalo.

Wire Rope Slings

Wire rope sling, known as Flatweave, has a flat bearing surface, is non-kinking, non-spiraling, and flexible. Two pairs of two ropes each are laid in opposite directions and united into a finished sling of two single tie ropes which ultimately pass



The Fire Protection of Asbestos is Invaluable!

WHEN FIRE BREAKS OUT there is immediate danger of its spreading from building to building, *via the roofs*. Authorities know that sparks and embers, falling on inflammable roofs, cause more than 60,000 fires a year!

Safeguard your plant against this danger with a J-M Built-Up Asbestos Roof! Made of plies of fireproof asbestos, it forms a lasting protection for the roof structure against outside fires. Result—on a J-M Asbestos Roof, even flaming embers burn out harmlessly.

J-M Asbestos roofs also withstand long exposure to sun, rain and inclement weather. They are rotproof, and require little maintenance. They don't have to be coated periodically to prevent the sun from drying them out.

For complete details, send for copy of the 48-page illustrated book, "Things You Should Know About Your Roof." Johns-Manville, 22 East 40th Street, New York, N. Y.

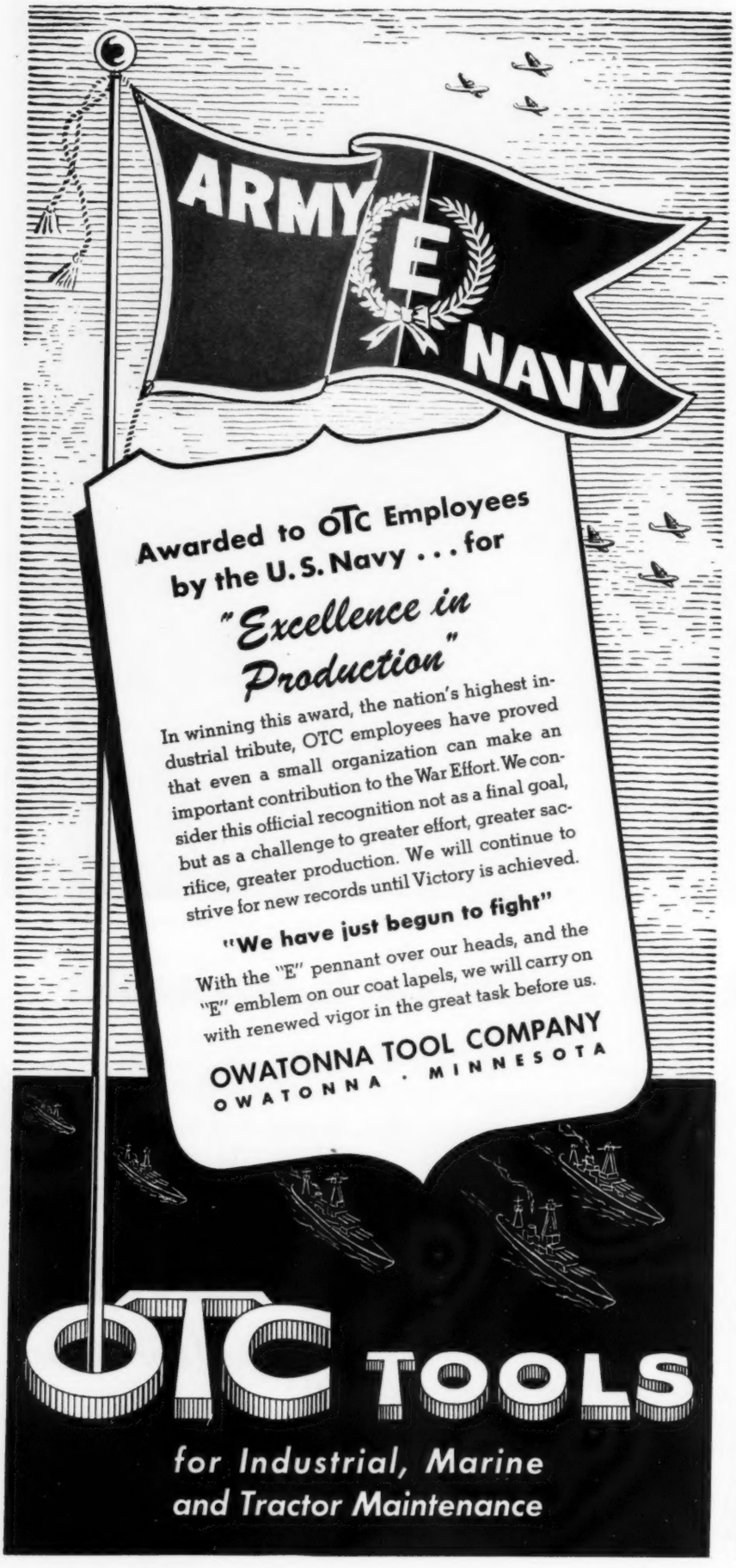
*The National Fire Protection Association has estimated that in 1940 (latest estimate available), 62,000 fires were caused by sparks falling on inflammable roofs.

Johns-Manville

Asbestos

Built-Up Roofs

JOHNS-MANVILLE JM PRODUCTS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NAVY
Awarded to OTC Employees by the U. S. Navy . . . for
"Excellence in Production"
In winning this award, the nation's highest industrial tribute, OTC employees have proved that even a small organization can make an important contribution to the War Effort. We consider this official recognition not as a final goal, but as a challenge to greater effort, greater sacrifice, greater production. We will continue to strive for new records until Victory is achieved.
"We have just begun to fight"
With the "E" pennant over our heads, and the "E" emblem on our coat lapels, we will carry on with renewed vigor in the great task before us.
OWATONNA TOOL COMPANY
OWATONNA · MINNESOTA
OTC TOOLS
for Industrial, Marine and Tractor Maintenance

around the pairs. The ends of the sling are provided with loops held by compressed steel sheaves. There are no splices, tucks, or servings. John A. Roebling's Sons Co., Trenton.

Angle-Set Vise

Universal 3-Way vise holds work involving either single or compound angles for any operation on or off a machine tool. Suitable for grinding complex toolbit shapes, drilling holes at hard-to-get-at angles, and milling tool blanks. Vise offers

ease of setting any complex angle, interchangeability of jaw plates, and portability. The double swivel cradles (each of which allows 90-deg. adjustment) and a full swiveling base (allowing 360-deg. rotation) provide three separate motions, individually adjustable and lockable. The wedge locks are 2000-lb. torque tested. Jaw opening 5 inches. Weight 70 pounds. Universal Vise & Tool Co., Parma, Mich.

Sealing Coat

A liquid, known as Carbo Seal, seals asphalt or bituminous coatings used for waterproofing. Prevents asphalt bleeding through light-colored coatings. Coating should dry for two or three days before putting on finish coatings by brushing lightly or by spraying. No fire hazard is involved. Sealing coat can be sprayed on roofs or hot areas adjacent to blast furnaces and similar units. Carbozite Corp., First National Bank Bldg., Pittsburgh.

Die Handling and Stacking Truck

Truck is of the cantilever type with a capacity of 1000 pounds. Furnished with removable die-handling boom and removable platform. Boom can be attached either to the carriage of the uprights. Platform is 25x30 inches; lowered height 8 inches; elevated height 62 inches; elevation, 54 inches; over-all height, 94 inches. Fifth wheel steer. All wheels are 8 inches in diameter, with roller bearings.

Can be used for lifting and stacking barrels and other materials, lifting skid load of dies. With the platform removed and the boom attached to the carriage frame truck can be used as a crane to pick

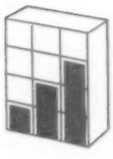
put motor controls TOGETHER

...save aisle space... wiring costs... installation time...

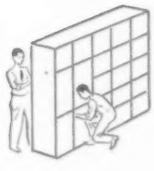
...with flexible, low-cost, standardized

Westinghouse Control Centers

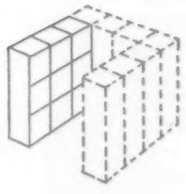
TAKES ANY COMBINATION OF CONTROLS—Starters up to 100 hp, 440 volts a-c, fit interchangeably. All starter panel spaces are multiples of the smallest size.



FRONT ONLY, OR BACK-TO-BACK MOUNTING—Standard 20-inch depth gives compact structure, yet permits back-to-back mounting of all controls for even more compactness.



SELF-CONTAINED STRUCTURE EASILY ADAPTABLE TO SPACE AND SHAPE REQUIREMENTS—Control Center is completely flexible. Control units are front-connected—quickly interchangeable. Structures are self-contained and can be fitted to space requirements.



Keep your motor controls off the machine, off the walls, away from the oil and hazards that cut short their service life. Buy them—completely factory assembled and wired—in a modern Control Center.

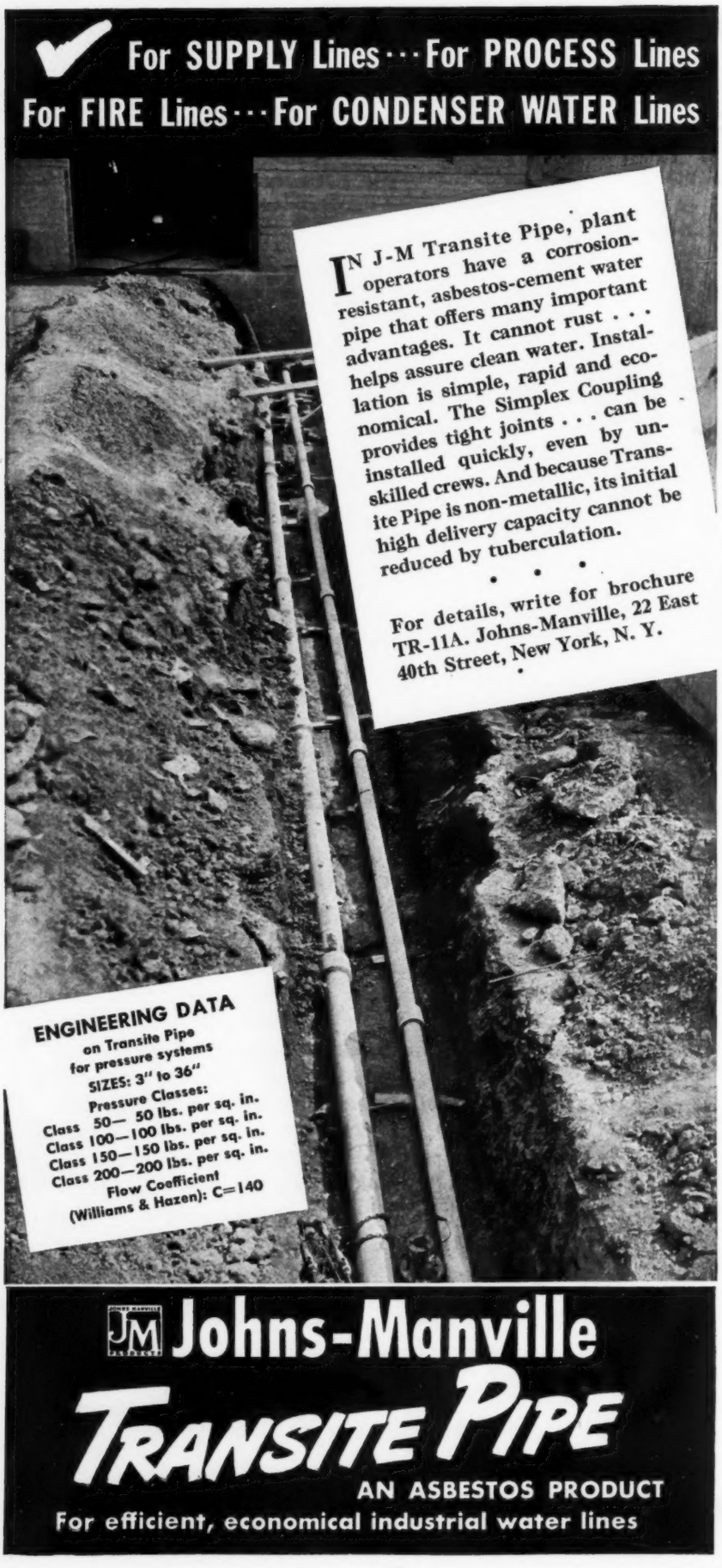
New Westinghouse Standardized Control Centers make possible all the advantages of modern, efficient centralized control at new low cost, thanks to standardized design. They enable grouping of combinations of control devices, up to 100 hp, 440 volts a-c.

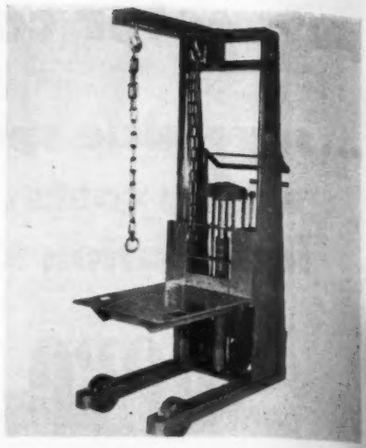
Structures are all 20″ wide, 20″ deep, and either 76″ or 90″ high. Any number of structures can be grouped together to centralize motor control for an entire plant or any portion of it.

Westinghouse Control Centers simplify electrical maintenance and inspection, and safeguard workers when control equipment must be inspected or changed. Get the full story on Westinghouse Control Centers. Write for booklet 3026. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

J-21219

Westinghouse CONTROL CENTERS


For SUPPLY Lines · · · For PROCESS Lines
For FIRE Lines · · · For CONDENSER WATER Lines
IN J-M Transite Pipe, plant operators have a corrosion-resistant, asbestos-cement water pipe that offers many important advantages. It cannot rust . . . helps assure clean water. Installation is simple, rapid and economical. The Simplex Coupling provides tight joints . . . can be installed quickly, even by unskilled crews. And because Transite Pipe is non-metallic, its initial high delivery capacity cannot be reduced by tuberculation.
For details, write for brochure TR-11A. Johns-Manville, 22 East 40th Street, New York, N. Y.
ENGINEERING DATA
on Transite Pipe
for pressure systems
SIZES: 3" to 36"
Pressure Classes:
Class 50— 50 lbs. per sq. in.
Class 100—100 lbs. per sq. in.
Class 150—150 lbs. per sq. in.
Class 200—200 lbs. per sq. in.
Flow Coefficient
(Williams & Hazen): C=140
JM Johns-Manville
TRANSITE PIPE
AN ASBESTOS PRODUCT
For efficient, economical industrial water lines



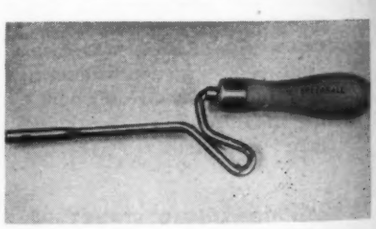
dies up from the floor and place them on skids. With the boom in position on top of the frame and the platform in position on the truck carriage, with skid and die in elevated position, can be used for separating dies. Takes but a few seconds to change from platform to boom truck, to a die-separating device, and back to a platform truck again. Lyon-Raymond Corp., Greene, N. Y.

Wax-Fortified Enamel

Machine enamel is claimed to stand up against striking tools, machine and cutting oils, strong cleaning agents, and so forth. Because it is impregnated with wax, it provides extra resistance to grease and dirt, repels water. Easy to wipe clean. Available in 1-, 5-, and 55-gal. containers, in light gray 7-B and dark gray (old standard). Application can be by brush or spray. S. C. Johnson & Son, Inc., Dept. FM-10, Racine, Wis.

Speed Screw-Driver

High-speed ball-bearing driving tool is known as the Aero Tool Speedball Driver. According to the manufacturer, this tool speeds up driving screws, countersinking, or removing burrs. Replaceable tips stored in the recessed handle, give the tool a



wide variety of uses. Can be supplied in several shapes with tips for Phillips screws, slotted-head screws, set-screws, or for burring and countersinking jobs. Tapered shank on tip allows easy removal but does not permit tip to turn in tool. Aero Tool Co., Burbank, Calif.

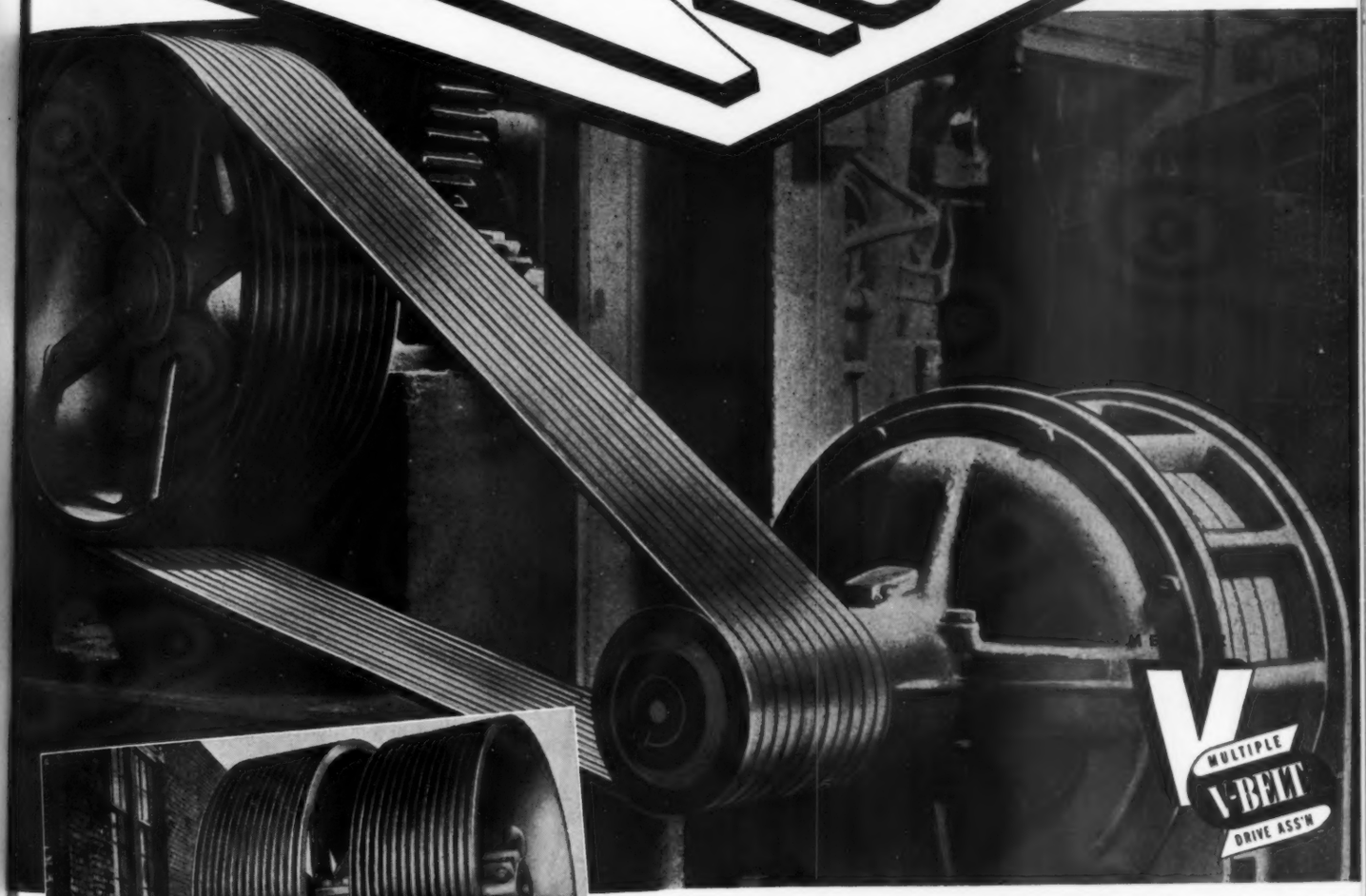
Electronic Robot

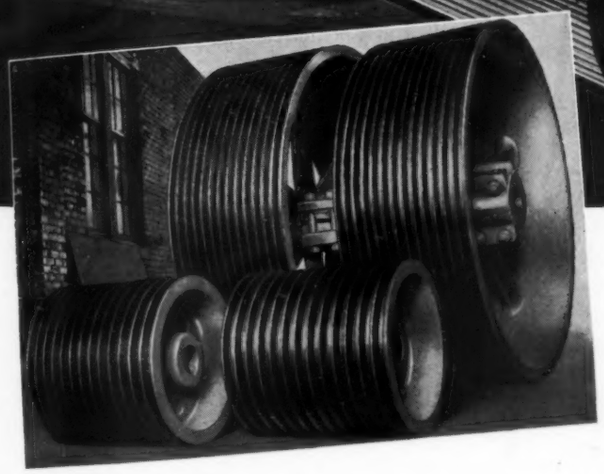
Photo-electronic robot, known as Detect-O-Ray, provides a self-contained white or infra-red light source. Used with a small mirror, it acts as a watchman against

Woods V-BELT DRIVES

transmit power efficiently and smoothly ...Keep machines turning out the goods for

VICTORY





Wood's V-Belt Drives are engineered to assure a maximum grip with more pulling power that transmits power with minimum loss . . . efficiencies are often as high as 98%.

Sheave grooves are precision machined, uniformly spaced and absolutely true, with side walls at proper angles. Belts are full moulded, flexible, resilient and enduring. Sheaves and belts match perfectly so that the harder the pull the greater the wedging action of the belt in the groove . . . the greater the percentage of power transmitted.

Our stock assortment consists of nearly 2800 drives, from ¼ H.P. to 100 H.P. with at least a dozen selections of center distances for each drive. They're fully described in our 64 page V-Belt Catalog . . . a copy is yours on request.

EVERYTHING IN POWER TRANSMISSION

Bearings — Collars — Clutches — Couplings — Contactors — Hangers — Pillow Blocks — Pulleys — V-Belt Sheaves and Complete Drives.

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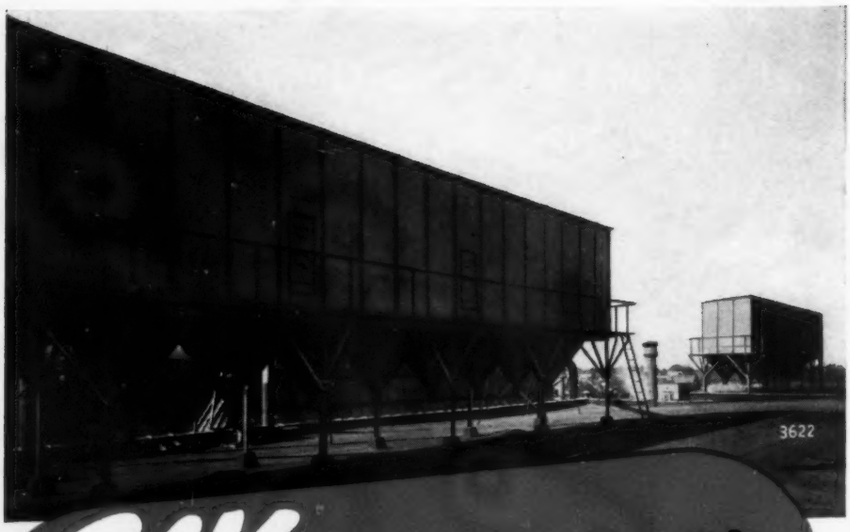
T. B. WOOD'S SONS COMPANY, Chambersburg, Pa.

BRANCH OFFICES: 387-391 ATLANTIC AVE., BOSTON, MASS. · 94 PLANE STREET, NEWARK, N. J. · 425 FIRST AVENUE, PITTSBURGH, PA.

LONG LIFE LINE



SLY DUST CONTROL

STOPPING WASTE SINCE '29

★These two filters on the roof of the plant of a large carbon company reclaim materials, protect health of workmen, and aid production.

Ever since their installation 13 years ago, they have given uniformly satisfactory service and during this period have effected big savings through materials reclaimed and better working conditions.

Sly Dust Filters provide exclusive advantages:

1 Greater filtering capacity because of more filtering cloth

2 Taut bags (patented) save power and improve dust removal

3 Bags more easily replaced

4 Automatic control (any degree) minimizes or entirely removes the human factor

5 Simpler shaker mechanism results in savings in maintenance and operation

This is a typical instance of Sly service. More than 5000 Sly Filters control over 100 different kinds of dust in more than half that number of industries. Write us fully so that we may analyze your situation and tell you exactly what can be accomplished.

THE W. W. SLY MFG. CO.
Cleveland, Ohio
4755 Train Ave.

SLY
INDUSTRIAL DUST CONTROL

prowlers, fire, smoke. Operates on 110 volts a.c. Over-all size is 5x5x7½ inches. Can be supplied with weatherproof housing. Power relays that plug into the unit are available also. The Detect-O-Ray Co., 216 N. Clinton St., Chicago.

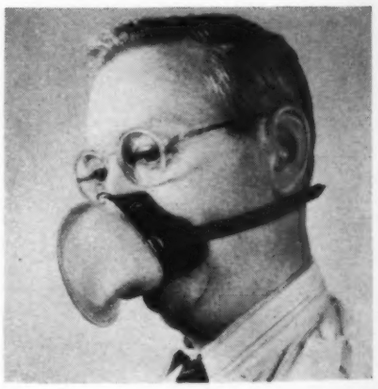
High Bay Reflector

Porcelain enameled reflectors for general lighting in foundries, machine shops, power plants, receiving and shipping departments, and similar industrial locations, are announced. Designed for either incandescent

or high-intensity mercury lamps. Available with locktite two-piece quick detachable construction or one-piece type for conduit or outlet box mounting. Multiple coat porcelain enameled reflecting surface is permanent, easily cleaned, and has a reflectivity of 80 percent. Westinghouse Lighting Division, Edgewater Park, Cleveland.

Dust Respirator

Respirator known as No. 10 is one of the lightest weight respirators to receive U. S. Bureau of Mines approval, the manufacturers state. Is practical for long periods of time. Breathing freedom is pro-



vided through inhalation and exhalation valves. Elastic headbands hold the respirator in place. Face piece is easily adjusted to fit the contour of the wearer's face, and is especially adaptable for use by women. Willson Products, Inc., 242 Thorn St., Reading, Pa.

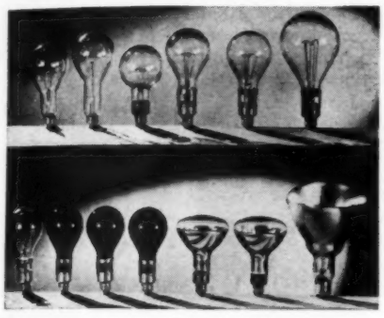
Wood Shelving

Quickly adjustable shelving, eliminated by steel priority, is now offered in wood, in open and closed types. Sections are

36 inches wide and 84 and 96 inches high, and may be had in 12-, 18-, or 24-in. depths. Top, base, shelves, braces, arms, and uprights are made of solid hard wood. Side panels, back panels on closed type are ¼-in. plywood. Finished with a green tinted preservative coating that reduces moisture absorption. Easy to set up. Features include dividers, bin fronts, adjustable shelves, and shelf boxes. Lyon Metal Products, Inc., 3056 Clark St., Aurora, Ill.

Infra-Red Heat Lamps

Infra-red heat lamps, designed in keeping with the limitations imposed by the War Production Board, include six clear, three ruby, and four reflector types. All feature the M-type tungsten filament and have their bases reinforced with asbestos-lined mechanical straps to withstand the



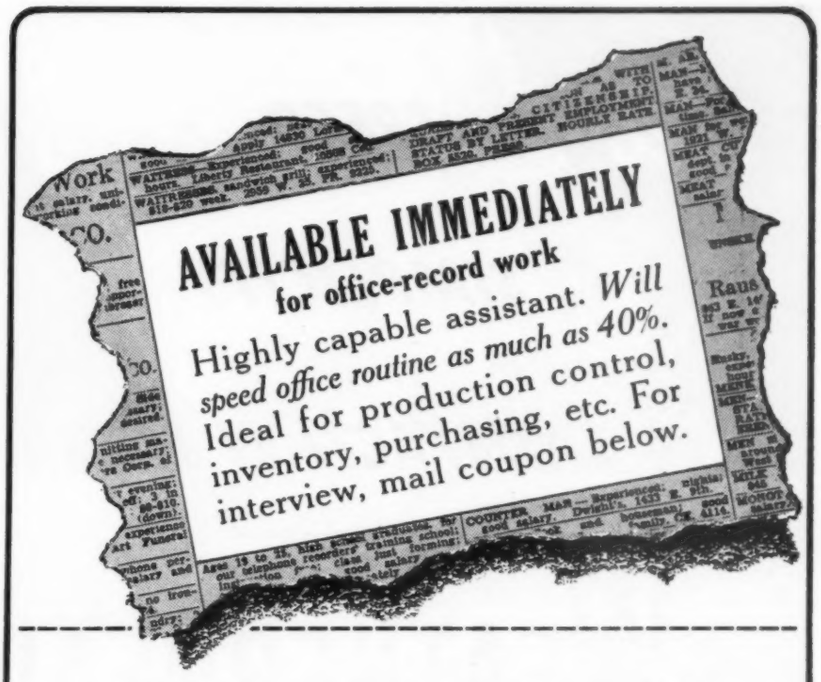
temperatures of tunnel installations. Reflector types have built-in reflector linings of pure silver sealed inside the bulbs for protection against dimming and tarnishing by fumes or dirt. Average burning life on all is in excess of 6000 hours. For baking, drying, and dehydrating infra-red energy is said to accomplish a better, faster, cheaper, and easier job than more conventional heat-treating methods. Instead of heating from the surface slowly inward, the action is reversed—the infra-red rays penetrate deep down into the surface films of lacquers, paints, and enamels to start the baking process from the inside out, instantly and uniformly. Wabash Appliance Corp., 345 Carroll St., Brooklyn.

Substitutes for Rubber

Substitute for critical materials utilized in gaskets and strips is a strip material with the spongy effect of rubber strip. Known as Fel-Pro Thiokol, strip material is produced by the application of Thiokol to a felt base. Material is weather resistant. Strips are available in lengths up to 6 feet. Felt Products Mfg. Co., 1530 Carroll Ave., Chicago.

Fire Retardant

Fire retardant liquid, known as Firepel, is an aqueous solution to be applied by brush or spray on unfinished wood surfaces. According to the manufacturers, the fire-retardant effect obtained by absorption of the chemicals is not rapidly destroyed by combustion. The properties last indefinitely when not exposed to


AVAILABLE IMMEDIATELY
for office-record work
Highly capable assistant. Will speed office routine as much as 40%. Ideal for production control, inventory, purchasing, etc. For interview, mail coupon below.

THIS SAME "ASSISTANT" is helping hundreds of America's business leaders increase office efficiency, cut costs and save valuable space.

It is called The Diebold CARDINEER—the rotary file that is revolutionizing today's record-keeping methods.

One turn of the wheel and CARDINEER instantly brings any one of 6,000 card records to the operator's finger-tips. That's the equivalent of 120 ordinary card files. Saves thousands of steps. Portable. Occupies less than 3 sq. ft.

Every executive interested in saving time, saving space, cutting record costs and speeding up work will want to investigate CARDINEER. Just mail the coupon below without obligation.

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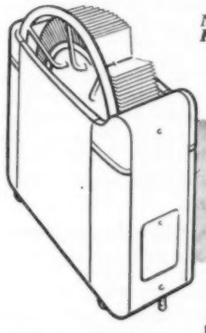
Offices in:
New York, Chicago, Cleveland, Detroit, Washington, Philadelphia, Boston, St. Paul-Minneapolis, Pittsburgh, St. Louis. Dealers in other principal Cities.



We carry CARDINEERS in stock for immediate delivery

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ROTARY FILE

Essential for today's record-keeping methods

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Please send me, without obligation, complete information on Cardineer Rotary Files.

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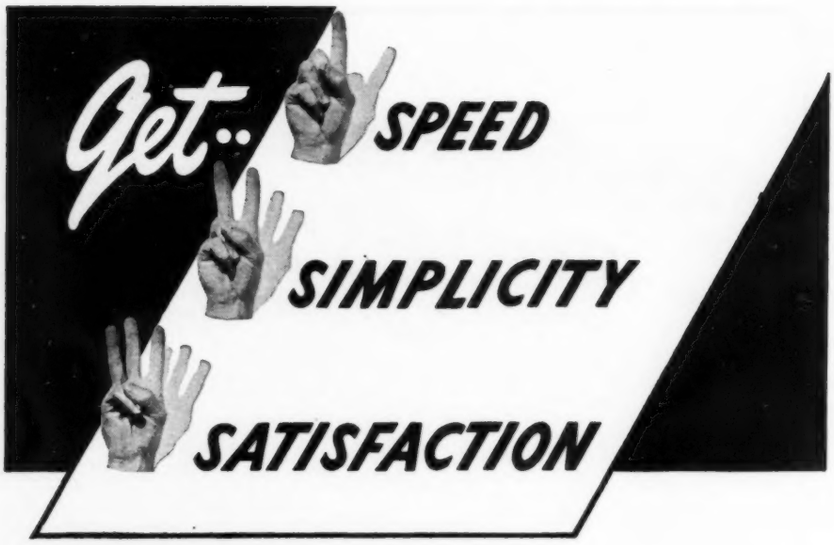
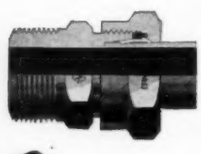


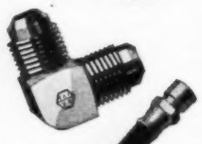
with WEATHERHEAD

FITTINGS AND HOSE

Weatherhead fittings and hose assemblies are engineered to meet the war-time demand for speed—for simplicity of installation—and satisfaction in performance.



ERMETO SAFETY FITTINGS—A modern method of connecting tubing that eliminates flaring, threading, welding or soldering. Suitable for any type of metal tubing, and since thin walled tubing may be used, reduces the amount of material required. *Ermeto Fittings hold up beyond the burst strength of the tube itself* and withstand excessive vibration without leakage of the joint.



BRASS TUBE FITTINGS—Quality tube service parts for small diameter tubing—a complete range of fittings in patented inverted, S. A. E., and compression types.

FLEXIBLE HOSE ASSEMBLIES AND FITTINGS—Non-metallic flexible hose for automotive, aviation and machine uses. Oil-proof and gasoline-proof. Weatherhead complete hose assemblies with fittings attached are quickly and easily installed for high pressure fuel, gas, air and hydraulic application.

We also manufacture low pressure hose which is finished in any length with necessary fittings.

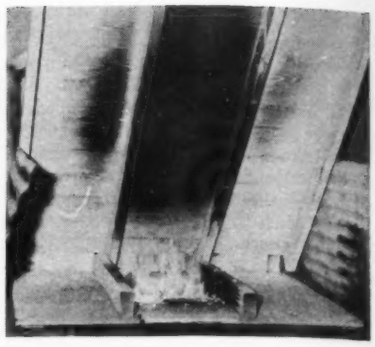
PACKLESS VALVES—An advanced product of Weatherhead engineering, these valves have only four working parts. Tested through 100,000 on and off cycles, Weatherhead packless valves are leak-proof, quick acting and extremely rugged in construction. Compact design, trim appearance, and low overall height provide attractiveness of installation.

Tell us the Weatherhead products in which you are interested and we'll send complete details.

THE WEATHERHEAD CO. · CLEVELAND, OHIO

WEATHERHEAD

TUBE FITTINGS · FLEXIBLE HOSE · VALVES · DRAIN COCKS
AVIATION, AUTOMOTIVE AND REFRIGERATION SPECIALTIES



weather. One gallon of the solution will cover approximately 200 square feet with two coats. Albi Chemical Corp., 9 Park Place, New York.

Heavy-Duty Trucks

Heavy-duty, 10,000-lb. capacity crane truck, known as Type CXF, was designed to handle heavy unit loads. Efficient operation of this crane is due in part to the reduction of dead weight. Hoist units are positioned so that they are available as counterweight. Closely spaced bridging over the top of the battery compartment, so that the operator can see along either side, increases safety of operation.

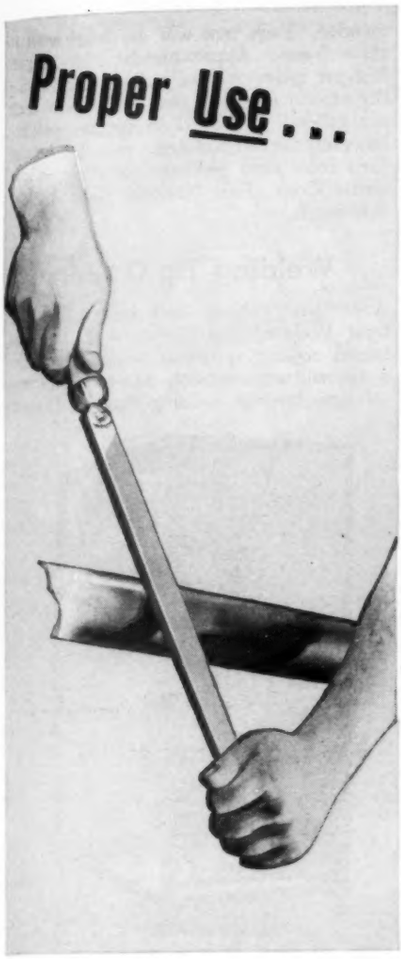
Mast on which superstructure slews is

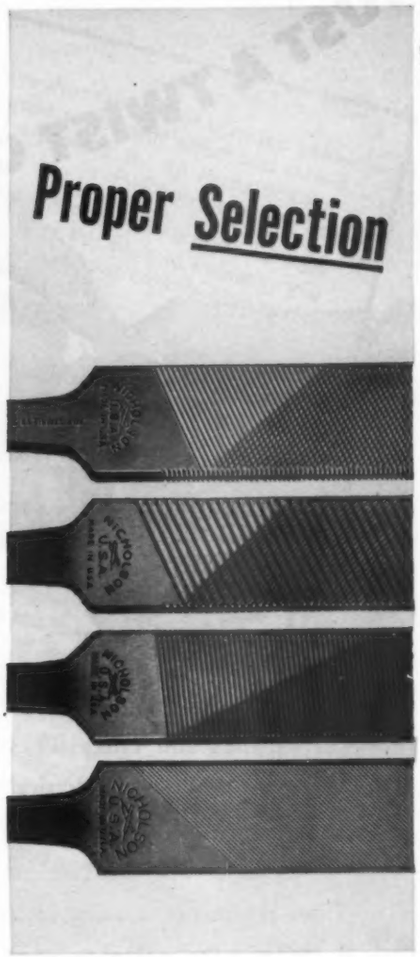
a tall member giving two widely separated points of bearing and permits a higher position for the topping cable idler sheave. All controls are located on the dash and do not swing with the superstructure. Travel controller makes careful and correct operation compulsory. Furnished with a protecting guard for the operator and automatic limit stops and brakes on all motors. The Baker Industrial Truck Div., The Baker-Raulang Co., 2168 W. 25th St., Cleveland.

High Temperature Coating

Coating known as Carbozite High Temperature Resistant Coating resists the harmful effects of temperatures up to 2000 degrees Fahrenheit. Prevents formation of scale and oxidation when applied to metal surfaces which are subject to direct flame, it is claimed.

Adaptable for application on the inside of firewalls to prevent spalling of mortar and brick. When subjected to temperatures of 1000 degrees, it will fuse to the surface and form a vitreous protective coating, resistant to the effects of acids and alkalis. Two applications are recom-





...saves time—saves materials—saves files

This is a war in which conservation is as important as *production*. It applies to tools as well as to materials and products. And few tools serve more widely than files.

Machine-shop and industrial concerns are having to get along with more and more inexperienced workers. Waste from improper file use, care and selection is becoming a growing problem.

Superintendents and foremen *can* do something about it. Posting or circulating the rules of proper file use and care suggested at the right will help to improve the worker's efficiency, save his time, increase his output, conserve materials, reduce spoiled work, make files themselves last longer (conserving file steels, too).

Nicholson has literature useful as "shop-school texts." Write us on any problem or efficiency program in which our experience with files and filing might be helpful. For your file needs, consult your mill-supply house.

**Free Technical Bulletins* on Nicholson or Black Diamond Special Purpose Files for: Stainless Steel, Aluminum, Brass, Lathe Filing (these four illustrated above), Die and Foundry Castings, Plastics, Die Making, Shear Tooth Filing.

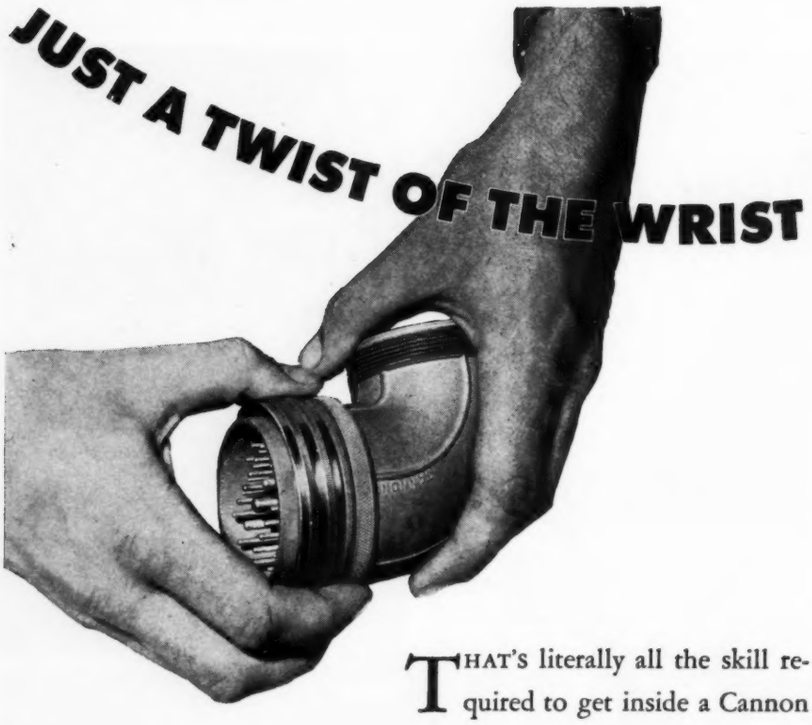
NICHOLSON FILE CO., PROVIDENCE, R. I., U. S. A.
(Also Canadian Plant, Port Hope, Ontario)

"DO" and "DON'T"

- Use *The right file for the job.**
- Don't "tear" into the work with too much pressure on the forward stroke.
- Don't "drag" the file back under needless pressure.
- Don't throw files among other tools or objects.
- Don't stack files against, or lay them on top of, one another.
- Keep files dry so rust will not corrode their cutting edges.
- Keep files clean of filings. After every few strokes, tap file on bench or wooden object to loosen chips. Brush file frequently with file brush or card; and always before putting the file away.

NICHOLSON FILES
FOR EVERY PURPOSE

NICHOLSON U.S.A.



THAT'S literally all the skill required to get inside a Cannon Connector of the kind widely used in planes and tanks. These connectors, or plugs, carry from one to a hundred electrical circuits. They must be plugged in and out just about as easily as you plug in a floor lamp. But they must also provide an absolutely dependable connection for the most vital circuits on the plane or tank.

The split shell is an original development of Cannon Electric. By removing the shell the frequent service inspections can be made easily and quickly. On short lengths of cable the split shell eliminates the necessity for any slack in the cable, and on certain types of plugs the split shell greatly facilitates connecting the cable to the plug.

Cannon Plugs have many other equally important advantages. That's why they are standard equipment in aviation, radio, tanks, television, submarines, geophysical research and many other fields where quick assembly, precision and absolute dependability are required.

CANNON ELECTRIC

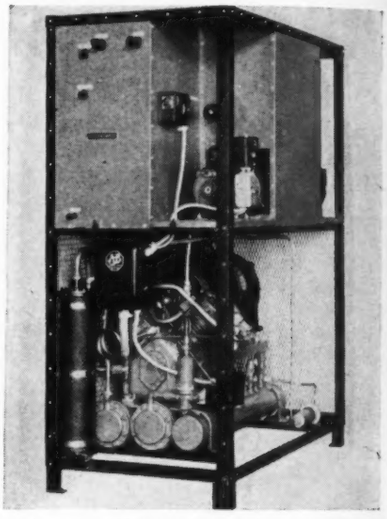
CANNON ELECTRIC
DEVELOPMENT COMPANY
LOS ANGELES, CALIFORNIA

Canadian Factory and Engineering office:
Cannon Electric Company, Ltd. • Toronto

mended. Each coat will dry hard within three hours. Approximately 150 square feet per gallon on the first coating, while the second coat will give 200 square feet per gallon. Furnished in various colors; however, the red and green coatings retain their color after prolonged heating. Carbozite Corp., First National Bank Bldg., Pittsburgh.

Welding Tip Cooler

A compact cabinet unit known as the Spot Welding Tip Cooler is a self-contained cooling apparatus which circulates a special non-corrosive, non-precipitating solution through welding tips of a spot



welder. Operating as a refrigerating machine, unit is equipped with two pumps driven by motors having cycling overload relays and a thermostatically controlled, 4-cylinder, vee-type compressor equipped with cutout. Unit is 55 inches high, occupies 25x44 inch floor space, can be operated by connecting condenser water lines and electrical circuit. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago.

Shop Boxes

Style 200 straight side shop boxes are available in two standard sizes: 6x9x3½ inches, and 8x12x4 inches, 20 gage, with drop handles at each end. Boxes are light in weight and easy to handle. Can be made in any size or gage of metal. American Metal Works, Inc., 1517 Germantown Ave., Philadelphia.

Motor-Operated Valves

Direct-current motor-operated valves designed for two-position (on-off) control of steam, water, or gas are announced. Suitable for use on heating and cooling coils, bottle-washers, plating tanks, humidifiers, hot water storage tanks, boiler feed water control.

Powered by a ball-bearing Eicor series wound d.c. motor. All motor parts are corrosionproof. Gear reduction of precision-hobbed heat-treated gears. Beryllium

Industry roars approval

OF THE

Gilmer

NATIONAL POWER-RECOVERY PLAN

"We believe that this type of work is a genuine contribution to the war effort and should be heartily endorsed by all manufacturing executives." —Hoffman Beverage Co.

"You have indeed done a fine piece of work and, in presenting this plan to industry, you have made a substantial contribution to the conservation of power." —Texas Power & Light Company

"Your company is to be congratulated on taking in hand this project and quite naturally we feel that this is a very good thing." —The Celotex Corporation

"... want to congratulate you upon your 'National Power-Recovery Plan' and its method of presentation." —Leeds & Northrup

"... very practical and useful." —Rohm & Haas

"To say the least, the program which your Company has inaugurated towards the objective of conserving power in industry is intriguing and most timely." —Motor Div., General Electric Company

"We extend our congratulations on your National Power-Recovery Plan which is so well explained in the booklet." —Johnson & Johnson

FROM all over the country, from big plants and small, from munitions factories and hospital power plants, the voice of Industry rises in a gathering crescendo of enthusiasm for the Gilmer National Power-Recovery Plan.

This hearty response—typified by the excerpts shown above—proves that Industry is anxious to gain the two-Boulder-Dams'-worth of power which experts say the Plan can salvage.

Yes sir, the Gilmer National Power-Recovery Plan has what it takes. It's up to you to *take what it has*, and use it to keep America's war production flying high.

Packaged in one convenient booklet, the Plan will come to you FREE. Just send in the coupon.

L. H. GILMER CO.,
Tacony, Phila., Pa.

Gentlemen:

Please send me without obligation a copy of the Gilmer National Power-Recovery Plan, and address it to:

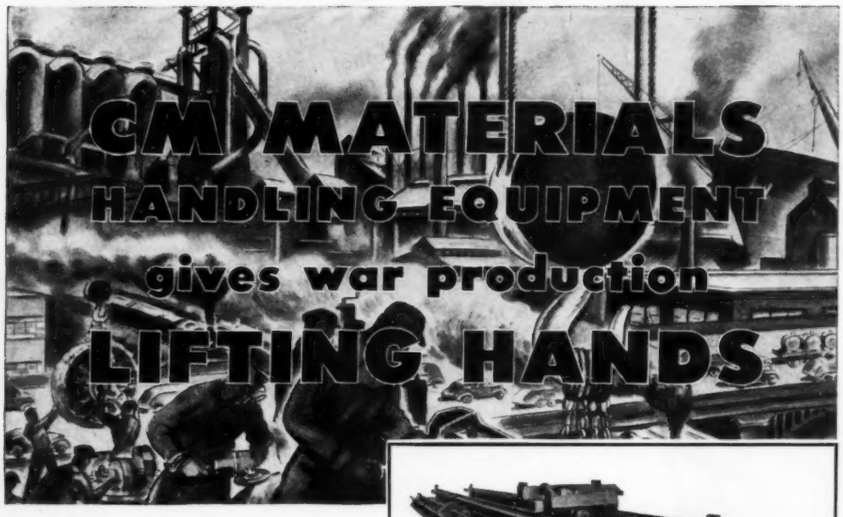
NAME _____ CO. _____

TITLE _____

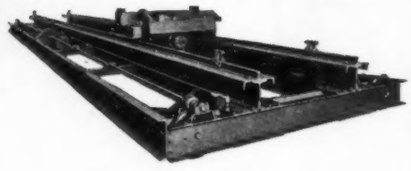
ADDRESS _____

L. H. GILMER COMPANY
TACONY, PHILA., PA.
The Oldest Firm of Rubber Fabric Belt Specialists

USE WHAT YOU LOSE
Gilmer BELTS



On all industrial fronts CM overhead hoists, trolleys and cranes are giving production "lifting hands" to increase war work output.



CM TRAVELING CRANES
Hand Power and Electric

Designed and engineered to speed up that very important operation of lifting and transporting heavy loads. There is a size and type suited to every application in every industry. A completely illustrated catalog on CM equipment sent on request.

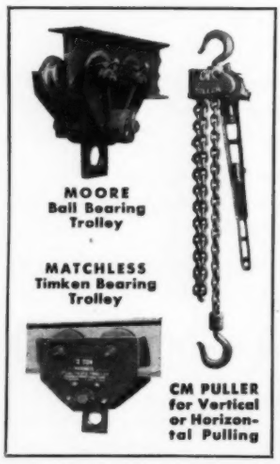
METEOR
Electric Hoist

CM MATERIALS HANDLING EQUIPMENT INCLUDES

- 4 types of hand hoists
- 2 types of low headroom hoists
- 3 types of I-Beam trolleys
- 4 types of electric hoists
- Hand power cranes
- Electric power cranes
- CM puller

COMET
Plug-In Type Electric Hoist

CYCLONE
Chain
Hoist



MOORE
Ball Bearing
Trolley

MATCHLESS
Timken Bearing
Trolley

CM PULLER
for Vertical
or Horizontal Pulling

INVEST REGULARLY IN VICTORY—BUY WAR BONDS AND STAMPS

CHISHOLM-MOORE HOIST CORPORATION
(Division of Columbus-McKinnon Chain Corp.)
120 FREMONT AVE. TONAWANDA, N. Y.
Branch Offices: NEW YORK • CHICAGO • CLEVELAND

copper limit switches. Fine silver contacts. Motor-operated valves are controlled from a single-pole double-throw switch or its equivalent, such as a thermostat, pressure switch, float switch, or relay. The unit may be mounted in any position. Barber-Colman, Rockford, Ill.

Hair Guards

StaSafe Hairgards are especially designed to help prevent the possible "scalping" of women employees working at moving machinery. Protection for women drill press operators, assembly line workers, and in some inspection jobs. Goggles are easily slipped on or off and the mesh allows enough ventilation to keep the wearer's head cool. Likelihood of burned or scorched hair is lessened during welding operations. Available in three styles. Standard Safety Equipment Co., 232 W. Ontario St., Chicago.

Contact-Making Clocks

Where a.c. of commercial frequency is used, Sauter contact making clock CYC-4 is used with maximum demand meters that require an accurate impulse timing element. Can also be used as an impulse timer for time recording instruments. Motor is of hysteresis type—450 r.p.m. on 60 cycles—and consumes about 3 watts. Can be furnished for 110 or 220 volts and any commercial frequency. Contacts are silver, rated at 1 amp. at 110 volts a.c. Standard setting of one-fifth second is easily adjustable. Impulse, as set at

COMMUNIQUE

Rubber is fighting a continuous battle on a front extending across five continents and over seven seas.

It is the hardest pressed of all materials engaged in the conflict.

It will win its battle, but not without difficulties that will engage its full fighting power for some time to come.

Dislocation of its ordinary life and pursuits is widespread, but is unavoidable if the ordinary life and pursuits of the nation are to be defended and restored.

It is our aim to do everything possible toward the achievement of ultimate victory.

BOSTON WOVEN HOSE AND RUBBER COMPANY

CAMBRIDGE, MASS.

Unbelievable!

how WALLUSTRE hides

MAINTENANCE, with a minimum of interruption to operating schedules, is of utmost importance today. That's why the Devoe Laboratories developed Extra-Hiding High Gloss WALLUSTRE, the modern paint that **does the job in just one coat.**

Another reason why maintenance engineers specify WALLUSTRE for all interior wall surfaces is that its lasting whiteness insures proper reflection and diffusion of every bit of light available.

Eight outstanding advantages make WALLUSTRE the maintenance paint for you to specify for your plant:

1. One-coat hides black.
2. Amazing initial whiteness.
3. Stays white longer.
4. Modern synthetic vehicle.
5. Tough — long lasting.
6. Brushes smoothly — easy to apply.
7. Ideal for spray application.
8. Economical — high spreading rate.

If conditions in your plant indicate a paint with high resistance to moisture, fungi or fumes, your Devoe Maintenance Representative can help you select the specialized type you need.

Write today for pamphlet WL-24 describing the complete Devoe Wallustre Maintenance Paint Line.

By improving sight with paint you help the National Safety Council's drive to reduce accidents and you build better morale among the workers in your own establishment.

DEVOE & RAYNOLDS CO., INC.

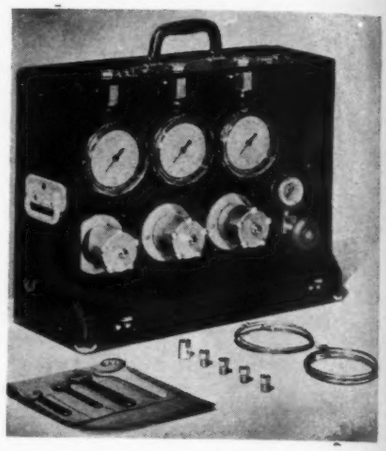
The 188th year of the oldest paint-maker in America

FIRST AVENUE AT 44th STREET, NEW YORK, N. Y.

predetermined intervals, can be 1, 2, 3, 4, 6, or 12 per hour. Inspection window is provided for checking time and program. The R. W. Cramer Co., Centerbrook, Conn.

Portable Gage Tester

Equipped with three precision laboratory test gages, accurate to within ¼ of 1 percent of full scale, Grove Comparator will check various ranges of pressure gages from 0 to 1000 pounds. Necessary testing



pressures are supplied from built-in, high-capacity air cylinders, which can be charged and recharged as often as required with any clean, dry gas, air, or oxygen. Fine degree of pressure control is provided by three pressure loaders mounted below each test gage. Loader serves as an accurate pressure-reducing valve with built-in automatic relief. Grove Regulator Co., 1190-67 St., Oakland, Cal.

Cover Glass

An improved method of treating cover glass—called Klearsite—for welders has been developed. Cover glass will stay clear for over 100 hours, welding time,

repelling the sparks and molten metal with which it comes in contact, it is claimed. "Dill berries," which stick to ordinary glass, slide off. Carter-Lockard Co., 225 W. 11th St., Los Angeles.

War Gas Extinguisher

Fire and war gas extinguisher is recommended by the manufacturer as fire extinguisher and decontaminator for the three major war gases: Chlorine, which affects the lungs (highly pungent odor);

Prevent Valve Failure

before it starts!

CHOKED TO DEATH
by accumulated deposits, because of improper installation, and lax servicing . . .

This valve never had a chance! It was installed in a downward line where the solids collected while the valve remained closed. The deposits choked off the flow of liquid and destroyed the seat.

A more favorable location of the valve in the line, or the use of a type better suited to the purpose, would have prevented the collection of solids. Or, if the line had been provided with a drain, if it had been flushed out at regular intervals – even in its faulty location, the valve could have been kept in service indefinitely.

All valve metals are precious today. Except for valves in the most essential wartime service, replacements are practically unobtainable. Careless destruction *must* be prevented, and it *can* be prevented, *before it starts* . . . by regular, systematic inspection . . . by replacement of worn parts in time to prevent valves from destroying themselves. Instruct new maintenance workers thoroughly. Select valves for new construction carefully; install them properly.

Valve conservation, always good practice, is now a vital factor in maintaining the flow of arms and supplies to our fighting men. Keep your valves operating efficiently. Jenkins Engineers are ready to advise any management in the fundamentals of effective valve conservation.

Army-Navy "E" Pennant, awarded to Jenkins Bros. for meritorious achievement in the production of war material.

Jenkins Bros., 80 White Street, New York, N. Y.; Bridgeport, Conn.; Atlanta, Ga.; Boston, Mass.; Philadelphia, Pa.; Chicago, Ill.; Houston, Texas. Jenkins Bros., Limited, Montreal; London, England.

JENKINS VALVES

For every industrial, engineering, marine and power plant service . . . in Bronze, Iron, Cast Steel and Corrosion-Resisting Alloys . . . 125 to 600 lbs. pressure.

THAT AID THE VISION OF

OUR NAVY

PORTLIGHT TYPE WIPER
Removes Sleet, Ice and Salt Deposits . . . and keeps going.

When rain and sleet are driven by wintry blasts . . . when sea spray thrown by plunging bows dashes against protective glass . . . these are the times when the mariner needs the clearest of vision.

Electrically driven windshield wipers, developed for our Navy, are so powerful that they literally scrape ice off glass yet can be reduced in action to wipe away gently the slightest sea mist. Ward Leonard Rheostats are used in many of these jobs to control exactly the motive power of the wipers.

This is just another of the many instances where Ward Leonard Controls developed for peace time service meet a vital need in war activity. If your war work requires any form of electric control, you probably will find exactly what you want in the Ward Leonard Line.

WARD LEONARD

RELAYS • RESISTORS • RHEOSTATS

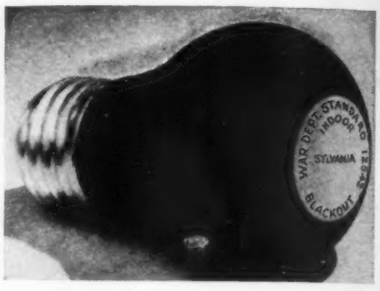
Electric control (WL) *devices since 1892.*

WARD LEONARD ELECTRIC COMPANY
55 SOUTH STREET, MOUNT VERNON, NEW YORK

phosgene, which affects the lungs (musty hay, green corn odor); and chloracetophenone, tear gas (apple blossom odor). Recommended also for combating automotive, airplane, industrial gasoline, cleaner, oil, paint, and grease fires. Is non-injurious and lasts indefinitely. One cubic inch of fire extinguisher upon contact with fire, has produced over 1000 cubic inches of fire-smothering gases. O. H. Adams Co., Milwaukee.

Blackout Lamp

Blackout lamp designed to provide a quick, easy, and economical method of supplying sufficient illumination for ease of movement during blackouts is announced. It is an A-15 type bulb, coated black except for a 1-in. aperture in the



bulb end which emits an orange-red light. Has a 14-watt filament, is available in two voltage ranges, 115-125 and 30-34 volts.

Lamp must be used in accordance with the instructions established by the War Department which are printed on wrapper accompanying each lamp.

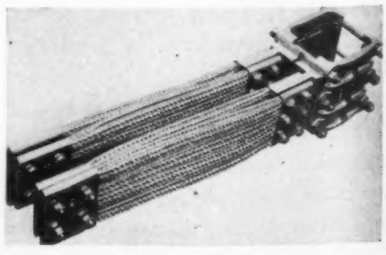
At present available only on a priority rating better than A-2. Sylvania Electric Products, Inc., Salem, Mass.

Industrial Trucks

Medium capacity (3000-lb.) industrial lift trucks of the tilting fork type, telescopic and non-telescopic, are announced. Available in gas and electric powered models, compact and low-slung, with a one-piece, rubber-and-reinforced, single-casting main frame that keeps the center of gravity low and thus adds to maneuverability and stability. Lewis-Shepard Sales Corp., 123 Walnut St., Watertown, Mass.

Flexible Connectors

Line of heavy-duty flexible connectors and expansion joints has been developed for use with square copper tubing. Cast-to-size clamp connector eliminates necessity of drilling square tube. Designs are avail-



HELP FOR THE MAN ON THE MACHINE

Tools for various machining operations, tool shapes, cutting speeds and feeds, cutting compounds, characteristics of the different Aluminum Alloys; all these things are discussed in this new book, "Machining Alcoa Aluminum".

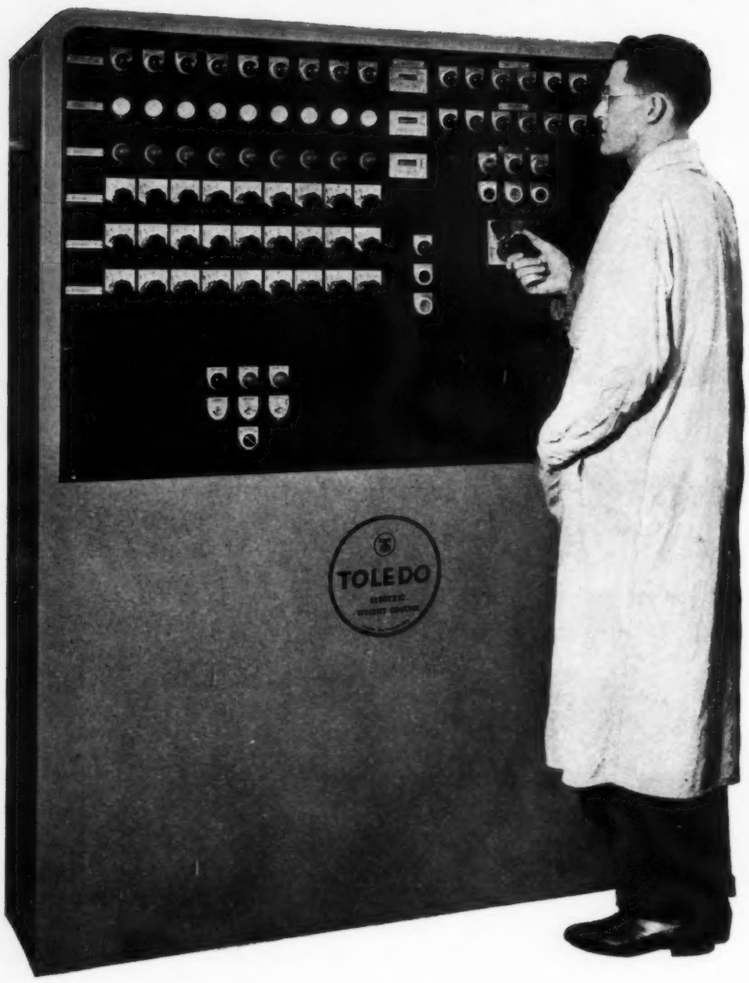
Beginners and experienced machinists will find this book equally valuable. It may contain your key to faster, higher quality production of badly needed war materiel.

Alcoa engineers continue to be available to assist you in solving new and unusual Aluminum fabricating problems. They'll also gladly counsel with you on your postwar thinking. For this help, and for copies of this new book, "Machining Alcoa Aluminum", write ALUMINUM COMPANY OF AMERICA, 2126 Gulf Building, Pittsburgh, Pa.

ALCOA ALUMINUM

Weighing

THE WAY TOLEDO DOES IT!



● This man is weighing 9 different ingredients that go into 3 furnaces of an alloy steel plant. He could just as well be controlling the batching operation of a glass plant... a chemical plant... or any other type of plant where batches are proportioned by weight.

The operation is made simple, fast, accurate and completely automatic by Toledo Scale control. Toledo Hopper Scales are set to pre-determined amounts for each ingredient. From there on Toledo automatic controls take over. Scales are electrically interlocked with one another and with related equipment. Accurately weighed batches may be carried away on conveyor belt. Rapid accurate operations with no chance for human error.

Toledo has solved countless problems in weighing, balancing, force-measuring and counting. Look to Toledo for the answer to *your* weighing problems. Write for complete information. Sales and Service in 181 cities in U.S. and Canada.
Toledo Scale Company, Toledo, Ohio.

IN WAR—AS IN PEACE

INDUSTRY LOOKS TO TOLEDO FOR ALL TYPES OF SCALES

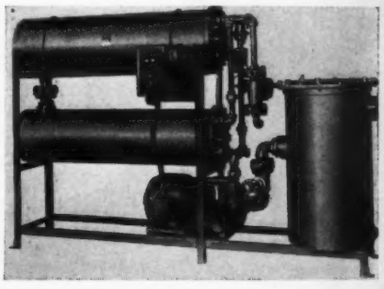
able for connecting tube to tube, tube to flat, or tube to any type equipment terminal. Leaded copper braids are pressed into thin wall copper tubing ferrules under hydraulic pressure to form contact pads for braids. They provide a means for connecting heavy conductors and at the same time eliminate possibility of trouble due to expansion of conductors. Delta-Star Electric Co., Chicago.

Small Lamps

Lamps with either a rigid or floating arm have a small reflector that holds two 6-watt fluorescent tubes. Universal type base and reflector joint give wide control of direction of light. Floating arm lamp has 24- or 34-in. extension. Rigid arm lamp available with 10-, 14-, or 18-in. horizontal arms. Both models are available in 110 or 220 volts a.c., 60 cycles, or 110 volts d.c. Floating arm unit stays put without locking. Dazor Mfg. Co., 4485 Duncan Ave., St. Louis.

Quench Oil Strainer

Oil strainer known as B&G Full-Flo oil strainer is specifically designed for quench-oil cooling. Employs two basic features which permit thorough cleaning of the oil without restricting free flow. First, is amply sized to accumulate large amounts

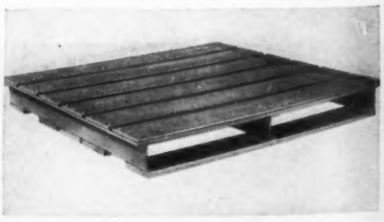


of scale before cleaning becomes necessary. Second, its screens are meshed to meet various operating conditions without clogging and yet afford full protection to the pump.

Not rated by pipe size, but rated to permit the maximum flow of oil the pump can deliver if there is a minimum of resistance in the suction line. Bell & Gossett Co., 3000 S. Wallace St., Chicago.

Wooden Pallet

Pallet, consisting of top and bottom wood slats, reinforced with steel at the ends and in the center, is available. Bolted construction permits easy replacement of the wood slats, while the steel ends protect the pallet from damage by



How NOT to do it! Don't nail up a board to keep belt on pulleys. Align pulleys correctly and keep them clean.

Note how belt hugs clean, correctly aligned pulleys. Belt runs true and is in excellent condition after three years because of daily checking and cleaning.

★ WAR on *Wear!* ★

MANHATTAN'S suggestions for the Care of POWER TRANSMISSION BELTS

THE greater the output, speed and strain, the greater the belt wear. "Keep 'em running" on the factory front—with less wear and trouble—by following these simple instructions.

1. Do not allow oil, grease or gasoline to come in contact with belt.
2. Avoid exposing belts to sunlight and excessively hot or cold weather.
3. Avoid heavy overloads.
4. Don't leave tools or other objects near belt to get caught in drive.
5. Don't allow belt to rub against stationary objects. (See inset photograph.)
6. Use right size and type of belt on pulleys of correct size—too small pulleys shorten belt life.
7. Do not try to take out all stretch on new belt. Install only tight enough to pull load without slipping—then shorten only if necessary.
8. Use proper type fasteners of correct size for pulleys.
9. Keep tight side down for greater arc of contact and more power.
10. Pulleys with excessive crown cause fastener failure.
11. Do not apply large belts by rope and power.
12. Use constant tension motor base on short center drives.
13. Cut belt square and line up before splicing. Seam side away from pulleys.
14. Keep pulleys clean, in good condition and in correct alignment so that belts will run true and wear evenly.
15. Keep proper tension. Too tight a belt may cause fastener and bearing trouble; too loose, slip and wear.
16. If dressing is necessary, use type recommended by belt manufacturer. Never use rosin. Correct fault in drive instead of dressing belt.
17. Provide take-up facilities.
18. Inspect splices and remove worn fasteners before they cause injury to belt.
19. Avoid slippage, evidenced by polished surface.
20. Use factory-made endless belts whenever possible.
21. Cut down large worn belts into smaller sizes for light drives.
22. Consult your MANHATTAN representative. Write factory or your distributor.

Inspect daily with special reference to above suggestions. It is constant care that reduces wear and keeps your belts turning your machines with the minimum of stoppage.

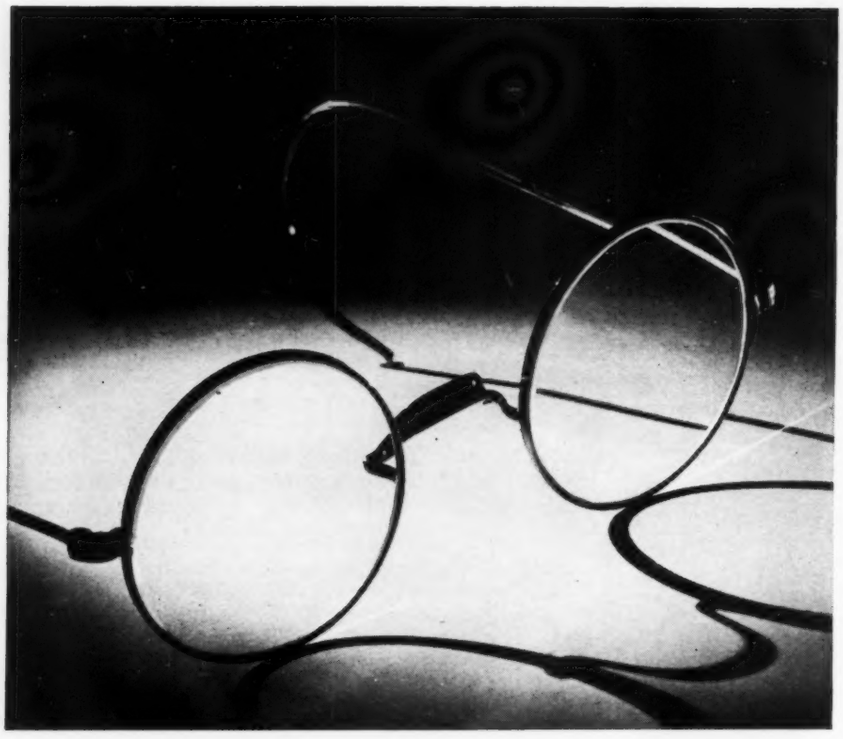
"Care of Power Transmission Belts" wall cards available for your maintenance department—also for Hose, V-Belts and Conveyor Belts. Write for those you want.

KEEP AHEAD WITH

MANHATTAN

THROW YOUR SCRAP INTO THE FIGHT!

THE MANHATTAN RUBBER MANUFACTURING DIVISION
of RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES PASSAIC, NEW JERSEY



There will be FEWER OF THESE

Eyeglasses symbolize eyestrain. By reducing eyestrain through proper lighting, your war production can be increased both in quantity and quality. Fewer man-hours will be lost, fewer rejects will come off your production lines.

Silv-A-King offers a complete lighting service—fine equipment (either fluorescent or incandescent) plus skillful engineering to lay out your lighting installation for maximum effectiveness. Our ability to serve you well in lighting comes from 21 years of experience as industrial lighting specialists. A Silv-A-King lighting engineer is at your call wherever you are located.

Bright Light Reflector Company, Inc.,
1027 Metropolitan Avenue, Brooklyn, N. Y.

Write for new, 16-page Silv-A-King book:
"Light Is An Essential Production Tool"

A Few Typical Silv-A-King Users:
AC SPARK PLUG
GENERAL MOTORS
FISHER BODY
INTERNATIONAL HARVESTER
JONES & LAUGHLIN STEEL
PITTSBURGH PLATE GLASS
and many others

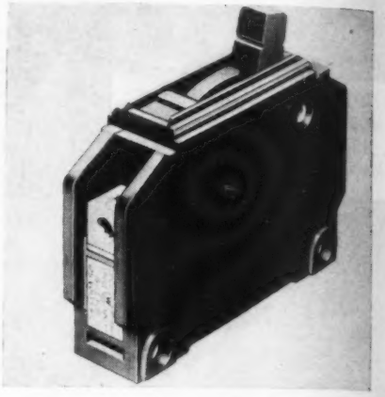
FLUORESCENT · INCANDESCENT
SILV-A-KING
EQUIPMENT

SILV-A-KING MAKES *Light* WORK FOR YOU

power fork trucks. Vital metal is thus conserved without sacrificing strength and all-around usefulness, and ease of handling is preserved. Available in sizes to meet any ordinary materials handling requirement. The Union Metal Mfg. Co., Canton, Ohio.

Breaker

Breaker, known as Quicklag, offers fast opening action on short circuits, full time delay on overloads, and low cost. Combines in a single unit a cooperative thermal-



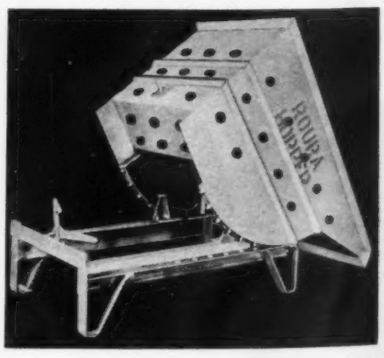
magnetic trip action. Available in ratings of 15, 20, 25, and 35 amperes, single pole only, 125 volts a.c. This 603 breaker can stop a force equivalent to 230 horsepower, and gives adequate protection for portable tools and appliances using small wire sizes, it is claimed. Westinghouse Elec. & Mfg. Co., East Pittsburgh.

Heat Circulator

Heat circulator, known as RECO, blows air upward. This forces air to travel along the ceiling, down the sides and up the center again, putting all the air in the room in gentle motion without drafts, it is claimed. Circulators can be supplied with 20 and 24-in. propellers, have 3 speeds, require 110-volt, 60-cycle a.c. current. Reynolds Electric Co., 2650 W. Congress St., Chicago.

Hot Material Hopper

Automatic-dumping hopper for handling hot forgings, castings, or other materials is announced. Units are built in standard 1-yd. capacity with perforations to suit re-



MILLIONS OF FEET OF AIR *Cleaned* AND *Quieted* DOWN

Quick facts about AIR-MAZE oil bath Filter-Silencers

1. 99.83% continuous protection against dust and dirt.
2. Less than 1½" H_2O pressure drop.
3. Constantly cleaned by automatic oil-washing action..
4. Highly efficient acoustical chamber.
5. Made in a wide range of sizes and capacities.

AIR-MAZE Oil Bath Filter-Silencers

reduce excessive noise . . . eliminate abrasive grit

When a large Eastern company decided to install this huge compressor in the power plant of their foundry, they faced the two way problem of:

1. **Protection of compressor against unusual dust conditions.**
2. **Protection of workmen from objectionable intake noises.**

As shown above, Air-Maze Oil Bath type Filter-Silencers provided the satisfactory answer. Automatic oil-washing action now handles the heavy dust load. The highly efficient acoustical silencer unit reduces intake noise to a minimum.

Have you a problem that involves the cleaning and quieting of intake air? It pays to ask the AIR-MAZE engineers first.

AIR-MAZE CORPORATION • *General Offices, CLEVELAND, OHIO*

AIR-MAZE

DEPENDABLE AIR FILTERS FOR EVERY APPLICATION

The Sponsors of Fibber McGee and Molly make good paint, too!

JOHNSON'S

Wax-Fortified

MILL WHITE

Made by the makers of Johnson's Wax

Superior Dirt Repellency
Better Light Reflectivity

New performance standards are here for Mill White! They're made possible by a remarkable achievement in paint formulation . . . the impregnation of paint with genuine wax. Johnson's Wax-Fortified Mill White leaves a wax-smooth surface of outstanding whiteness. The surface resists dirt, moisture, marring, soiling. It cleans quickly and easily. Light-reflective values are retained longer. These qualities are especially advantageous now that both manpower and materials must be conserved. Write today for new booklet, the "Why and What" of Wax-Fortified Paints.

S. C. JOHNSON & SON, Inc.
Industrial Maintenance Division
Dept. FM 112, Racine, Wisconsin

quirements. Full ⅞-in. plate is electrically welded for permanence. Reinforcing angle is 2x2x⅞ inches. Heatproof construction prevents warping or buckling. No manual lifting is necessary, hopper unloads automatically when trip lever is released and returns to loading position when empty. Standard units fit any standard type lift or tiering truck. Special models can be built. The Roura Iron Works, 1406 Woodland, Detroit.

Force Pump

A pump, known as the Portable Forced-Induction Pump, Series 50, handles materials such as sealing compounds, sound deadeners, insulating materials, putty, viscous grease, and heavy lubricants. Such

materials can now be pumped directly from original container to the point of application. Forced-induction priming principle is used. Unit is portable. The Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis.

Bearing Metal

Bearing metal, known as Rex is within the government's tin limitation order. Properties of the metal compare favorably with those of the former high tin base babbitts: tensile strength (lb., per sq.in.) 8200; percent elongation in 2 inches 1.2; reduction in area 1.8 percent; compressive strength (lb. per sq.in.) 17,500; specific gravity 9.60; Brinnell hardness 25.0; proper pouring temperature 625-675 degrees Fahrenheit.

The manufacturers announce that this metal does a creditable job as a substitute for high tin base babbitt in most present uses, if the lining is properly supplied and the bearings are carefully fitted and lubricated. National Bearing Metals Corp., St. Louis.

Vise

A patented nut and pawl makes it possible to open and shut recently announced vise like a drawer, and to lock it in any position with only two right turns of the handle. When the pawl is engaged on the steel rack it is in working position and ready to grip the part. Two left turns of the handle disengage the pawl and permit opening and closing the jaws to fit the part to be gripped. Cast-

ENLISTED *for the* DURATION

5 Reasons Why

1 Easy to assemble, inspect and lubricate.
2 Occupy very little space.
3 Keep out dust, dirt and moisture; keep in lubricant.
4 Equipped with the exclusive SKF Triple Seal.
5 Replace plain bearings without the necessity of machining shafts.

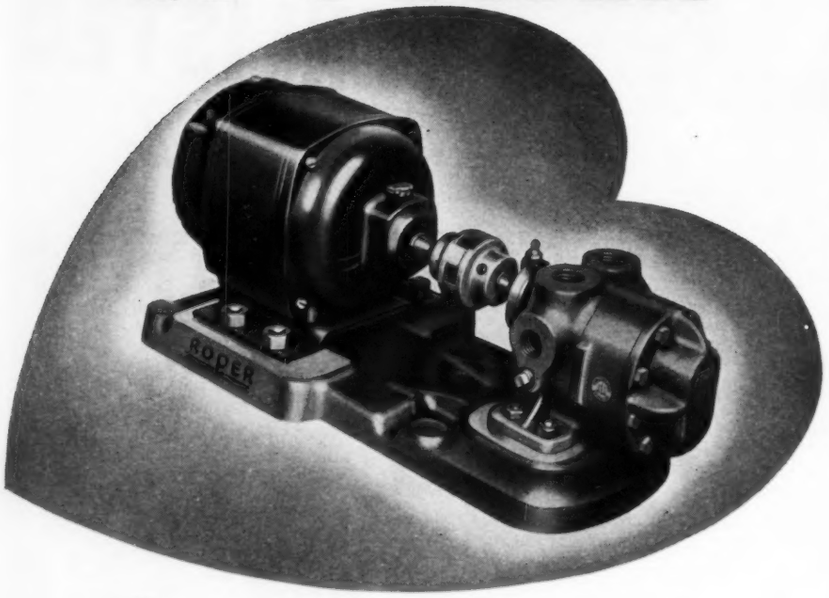
WHEN the word flashed back that the Japs had attacked Pearl Harbor, thousands of SKF Pillow Blocks were guarding SKF Bearings against Friction on America's machines. Since then, thousands more SKF's have enlisted in the War Effort . . . defending bearings against lubricant leakage, dust, dirt and moisture . . . making sure the bearings give all they've got on the machines that keep Production UP . . . saving lubricant, time and man power in an all-out drive for Victory. Protect your bearings, and you protect machines that make the weapons that lick the enemy. SKF Industries, Inc., Phila., Pa.

5136

SKF

BALL & ROLLER BEARINGS
PILLOW BLOCKS

THE HEART OF POWER



Is a *Dependable* Lubrication System

Present day war demands for ever increasing production place added burdens on lubricants and lubricating systems. They must function constantly and efficiently for the duration. Roper lubricating oil and hydraulic power units, built to the exact requirements of each installation, are meeting the challenge. They are giving dependable all-out service in practically every industry.

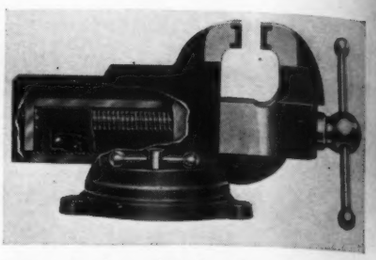
With only two moving parts, the simplest basic design yet conceived, Roper Pumps produce the very maximum of mechanical and volumetric efficiency. So, if you need pumps that can lick a tough job, pumps that can take it day in and day out, Roper is the name to specify. There are models with nearly every conceivable capacity, speed, drive, mounting and piping arrangement.

HYDRAULICALLY BALANCED

ROPER *Rotary* PUMPS

Write for Catalog 938. This valuable book contains a summary and a digest of factual information concerning pumps and pumping problems. Your copy will be mailed promptly upon request.

GEO. D. ROPER CORP., ROCKFORD, ILL.



ings are of semi-steel, all working parts are of steel, precision machined, fully inclosed, and interchangeable. A swivel base locking bar with two screws assures a positive lock in any position and equalizes strain. Available in three sizes—4½, 6, and 7 inches—in swivel and solid base types. A special woodworker's vise swings to any desired position, is equipped with three wooden faces and a metal jaw, and embodies the same quick-action principle. Pacific Vise Co., 6331 Hollywood Blvd., Los Angeles.

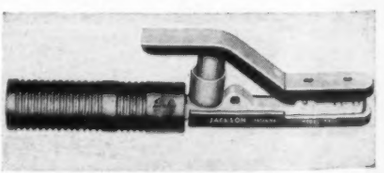
Electric-Hydraulic Barrel Pumps

Electric-hydraulic barrel pumps are fully inclosed, are sealed against the entrance of air, dirt, grit, or moisture, and are self-lubricating. Pump, complete with ½-hp. motor and hydraulic cylinder, is mounted rigidly on a flanged head which fits snugly over a standard drum permitting oil, or light, medium, or heavy greases to be pumped from the original container.

Pumping action is automatic and is controlled by pressure switch. When the grease outlet is opened the reduced pressure in the line starts the motor. When the grease outlet is closed, the pressure shuts off the motor. Pumps can be furnished in six different discharge capacity and pressure combinations to meet different service requirements. Trabon Engineering Corp., 1814 East 40th St., Cleveland.

Electrode Holder

Insulated welding electrode holder known as Quick Trik, with detachable "stinger" has been introduced. The female section of the cable connector is permanently soldered to the cable lead and remains in the insulated handle. Detachable jaw section—the stinger—is snapped into the female section by a quick twist of the operator's wrist and is ready for business. Cam mechanism locks male and female



sections together. The lock is said to be positive and may be quickly disengaged. The manufacturers claim that the use of this holder eliminates waste of time in changing cable connections and does away with dangerous loose cable ends kicking about when the stinger end is detached. Made in three models, all insulated—Model TA-1, 300 amp. with

How *KEENER EYES* Can Help to *SUSTAIN* Production*

In the human eye you'll find the answer to why proper lighting is so important, why it increases the speed and ease of seeing, thus conserving energy which otherwise is wasted in trying to see!

SEND FOR THIS FREE GUIDE

to make certain you are not overlooking important lighting factors essential to a sustained flow of increased output.

Contains complete data on how to approach, analyze and solve lighting problems. How to analyze the seeing task and determine lighting requirements. Valuable data on lighting as it relates to the problems of increased production, fatigue, accident reduction, greater utilization of floor space, 24 hour operation, etc. Also 21 ready to use solutions of lighting problems most frequently encountered in war production plants. Sent free of cost or obligation. Simply address your request to Benjamin Electric Mfg. Co., Dept. N, Des Plaines, Illinois.

Experience in England and in our own production has proven the importance of doing everything possible to correct those conditions which adversely affect the endurance of men and women to sustain both the quantity and quality of output day after day and month after month.

High on the list of things to do to conserve employee endurance and to minimize fatigue is to insure KEENER EYES for every employee in the plant by providing the proper lighting for every seeing task!

Relationship of Lighting to Fatigue. Inadequate or improper lighting has been shown to be an important factor in employee fatigue.* *Because it takes energy to see!** The act of seeing involves thousands of tiny eye muscles, nervous and physical energy.* Time spent in trying to see, therefore, involves physical fatigue.* The greater the effort of the eye to see, the greater the drain on the body's energy reserve. Such fatigue in turn is reflected in reduced production rates and increases in errors, defects and spoilage.

Save Energy . . . Increase Health and Efficiency of All Employees. Provide proper lighting and the extra energy formerly required in trying to see can be converted into useful production energy, increasing the worker's ability to stay on the job for longer periods of time without detriment to his well being. Raise the lighting levels and older eyes are raised to the efficiency of young eyes . . . less drain results on their reserve energy . . . the extra light helps compensate for the older employee's loss of visual acuity.*

Reduce Accidents. Often closely allied to the fatigue problem is the problem of accidents.* Striking examples of the close relationship between the quality of the lighting and the accident frequency are not difficult to find. For example . . . in one plant, accidents decreased 11 percent after the old lighting system was replaced with a new one.*

Proper Lighting is Productive Lighting. Proper lighting is a production tool that is of vital importance in sustaining high output. The amount of light considered proper is determined by the seeing task involved. In general, the greater the difficulty in seeing the object or work, the higher the lighting levels required*. Most industrial and office tasks today require from 35 to 75 footcandles of illumination in comparison with today's estimated average of seven and one half footcandles. Productive lighting, however, is not just plenty of light. Equally important is the quality of the light provided.* It must be suitable in regard to direction, diffusion, glare and shadow.

Function of Lighting Equipment. It is the function of Benjamin Lighting Equipment to provide lighting of both proper quantity and quality required by the seeing task. Available for this purpose are Benjamin units of many types utilizing either Fluorescent, Incandescent or Mercury lamps as a light source. Typical solutions utilizing this equipment are given in the "Benjamin Specifications for Productive Lighting in War Plants" described at left.

Request your copy, available now, without cost or obligation. Write Benjamin Electric Mfg. Co., Dept. N, Des Plaines, Illinois.

* *Authority for many of the statements contained in this advertisement are based upon data contained in the publications of the Illuminating Engineering Society, the National Safety Council, the publication "Plant Efficiency" by the War Production Board and* American Recommended Practice of Industrial Lighting *approved by the American Standards Association.*

BENJAMIN TRADE MARK

WORLD LEADER IN INDUSTRIAL LIGHTING EQUIPMENT

Distributed Exclusively Through Electrical Wholesalers

WHAT YOU SHOULD KNOW ABOUT PIPE HANGERS!

There is no place for guesswork in the selection of Pipe Hangers. The following excerpts from the American Standards Association Code for Pressure Piping give time-proved guidance to correct procedure.

MALLEABLE IRON CASTINGS may be used for pipe clamps, beam clamps, hanger flanges, clips and bases, swivel rings and similar parts of pipe supports, but their use shall be limited to such cases where the operating temperature of the pipe line will not be in excess of 450°F.

STEEL or WROUGHT IRON can be used throughout for hanger rods, turnbuckles, beam clamps, pipe clamps, supports, rollers, guides and bases.

GRINNELL offers an ENGINEERED PIPE HANGER

for each specific service . . .

MALLEABLE IRON ADJUSTABLE SWIVEL RING (Split Ring Type) – Underwriters Approved – Patented. Can be used with coach screw rod or machine threaded rod with practically any type of ceiling flange, expansion case, or insert. Swivel shank allows adjustment. No temporary support of pipe line is needed while making adjustments. Swivel shank locks automatically when pipe is in desired position. The hinging of the ring is off center, providing sufficient seating to hold the pipe before closing the ring.

WROUGHT STEEL ADJUSTABLE PIPE CLAMP – Underwriters Approved. Consists of two half-bands bolted together with Weldless Eye Nut and Bolt. When used with U.F.S. I-Beam Clamp with Weldless Eye Nut, provides for at least 3 inches of horizontal pipe movement in any direction per foot of hanger rod length.

For complete details, write for catalog of Grinnell Adjustable Pipe Hangers and Supports. Grinnell Company, Inc., Executive Offices, Providence, R. I. Branch offices in principal cities of United States and Canada.

GRINNELL

WHENEVER **PIPING** IS INVOLVED

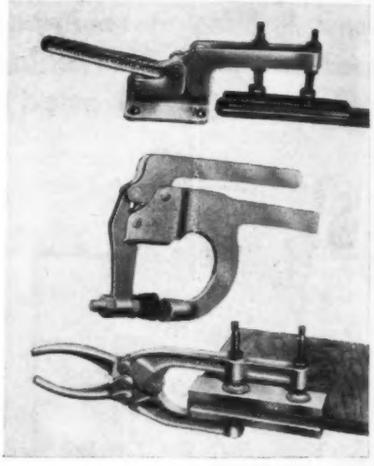
stationary jaws; Model TA-2, 300 amp.; and Model TA-5, 500 amp. with replaceable jaws of Mallory 3 Metal. Jackson Products, 3265 Wight St., Detroit.

Fluorescent Fixture Mounting

Continuous-row industrial fluorescent fixtures now come equipped with "Slide-Grip" hangers. These adaptable mounting clamps provide fast installation and easy maintenance. Allows a better alignment of fixtures. Hangers are mounted first, then fixture sections are snapped into place. Applications for chain, surface, rod, or messenger-cable mounting. Sylvania Electric Products, Inc., Ipswich, Mass.

Clamps

A clamp with large throat and handles at right angles to the clamping position is suitable for holding L-sections. Rubber caps on contact surfaces prevent slipping and marring. Clamping pliers with parallel extended jaws and two spindles provide a means for holding flat pieces together



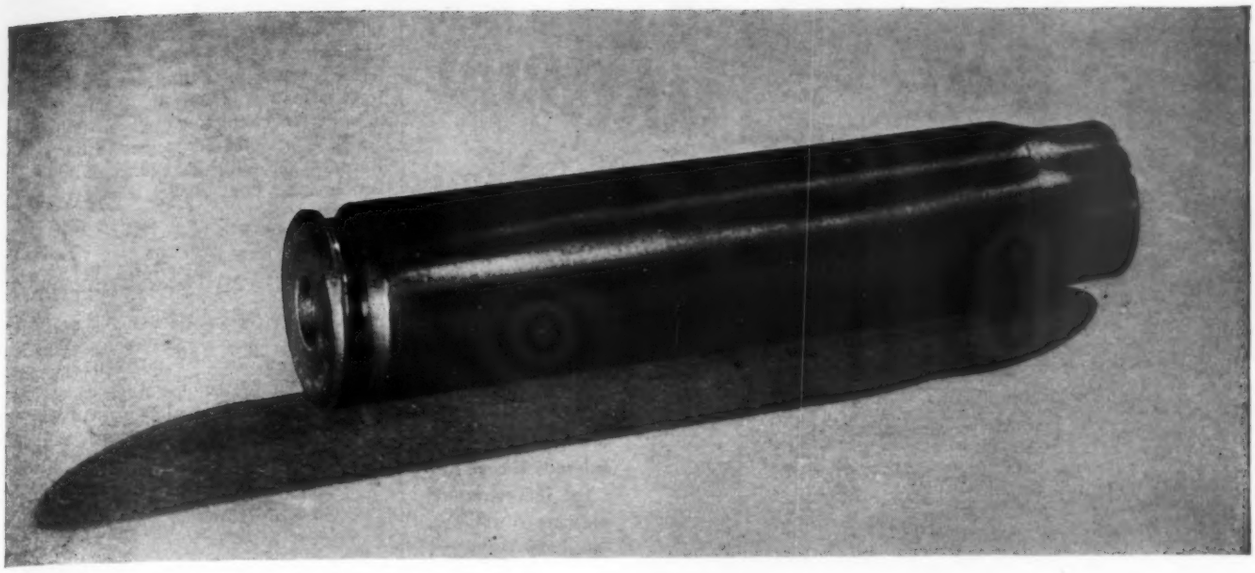
for welding, gluing, or drilling. A simple flip of the handle closes a third type of clamp on the work it is to hold. The rubber capped spindles must first be adjusted to the job. They remain in position until changed to accommodate another job. Knu-Vise, Inc., Detroit.

Luminescent Badges

Identification badges with luminescent background, opaque lettering and picture are available. Badge is covered with plastic and has metal back. Luminescent civilian defense signs and badges and marking tape are also available. Cardy-Lundmark Co., 1801 Byron St., Chicago.

Oil Filter

Designed to remove chips, coarse dirt, fine abrasive particles, and gummy oxidized elements from cutting oil or coolant, Klenzstream filter is said to increase production, reduce costs of machining, and reduce skin infections induced by razor-sharp particles of metal. Dirty cutting



A PRESENT FOR HIROHITO

. . . a Suggestion for YOU!

Until recently, brass was standard for artillery cartridge-cases. Now, to conserve highly critical copper and zinc, they are being made of steel. This change created a brand-new problem; how to protect these steel cases against abrasion, corrosion and chemical action at terrific heats.

Although we are specialists in protective coatings for *maintenance*, rather than *product-finishing*, we tackled this problem; and our research chemists developed a formula which meets the requirements of the tough Government specification; a clear baking varnish which we designate as #43.

You may, or may not, be interested in #43. If you are filling a contract for steel cartridge cases, you'll ask us about it, of course.

NOW *the suggestion for* YOU:

You are interested in maintaining your plant at high over-all efficiency. You know that rusted, corroded piping, tanks, machinery and equipment *can't* be replaced for the duration. You *must*, to quote a certain high naval officer, "Do the best you can with what you have"—and *that* means use of the *most effective protective paints* your money can buy.

Why not utilize—in solving your maintenance problems—the same *quality of scientific thought* and *practical production* which met this war-emergency problem?—the same thought and skill which, for fifteen years, have been providing Industry with *special* protective materials to meet *special* maintenance-painting problems, stocked by distributors in practically every city in this country?

One of our Protective Coating Engineers is available, near you, for consultation without obligation; ready to help you with your individual special problem. He is a good man to know. May we send you his name?

THE WILBUR & WILLIAMS COMPANY

Park Square Building, Boston, Mass.

Did You Know That You Can . . .?

STOP rust on pipes, tanks, machinery and equipment?
PREVENT acid—and alkali—corrosion?
PROTECT constantly damp metal surfaces?
REPLACE metallic surface-finishes?
HIDE bleeding stains?
STOP dusting and wear of concrete floors?
OIL-PAINT over new, damp plaster?

Ask us about these and other maintenance problems!

THE WILBUR & WILLIAMS COMPANY
Park Square Building, Boston, Mass.

Please have a Protective Coating Engineer call on

.....
date

Name and Title.....

Company .....

Address .....FM&M-11-42

Engineered TIMBER is the new heavy construction MATERIAL

TECO's great progress in engineering timber to heavy construction is a boon to wartime architects & engineers . . and TECO structural advantages will help to rebuild the world tomorrow!

A SIMPLE, ingenious device . . . the TECO TIMBER CONNECTOR, *which greatly increases the shearing strength of bolted connectors between wood members* . . . has changed timber from a carpentry to a modern engineering material.

Big timbers are now being used throughout the country in most all newly constructed war plants, hangars, shipyards, cantonments and warehouses.

TECO advantages . . . *including time, money, and material savings as well as a better structure* . . . are just as emphatic on short-span or long-span timber trusses.

No builder should be without descriptive and illustrated details of the TECO System of Construction . . . no architect or engineer without our helpful reference book *Typical Designs of Timber Structures*. Write us NOW . . . and get the jump on tomorrow.

The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

Timber

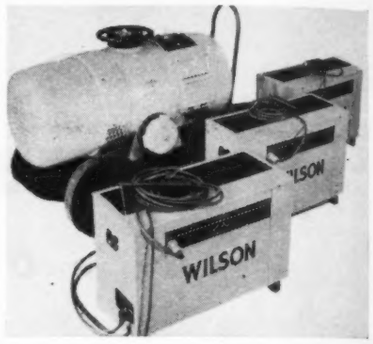
ENGINEERING COMPANY

★ WASHINGTON, D. C. PORTLAND, OREGON ★

oil flows upward, progressively filling a series of removable trays in which the heavy chips settle out, then passes through fabric-covered filter units which remove foreign matter. Oil is withdrawn for reuse by a circulating pump. Filter is available in any capacity. Schurs Oil Burner Co., Oil Filter Div., 4216 Long Beach Ave., Los Angeles, Calif.

Arc Control Stations

Auxiliary electric devices, known as Honey Bee arc control stations are made in capacities of 75 and 150 amperes. Switch held in the operator's hand gives remote control of welding current within predetermined limits. Switch may be combined with the electrode holder. When two or more arc control stations are connected to a single generator, a like number of welding arcs can be operated simultaneously. Each operator regulates his own current and weld without affecting the others. Control station accomplishes: Closer control of the welding current; individual remote control of current; current control to assure sound smooth welds; maximum usefulness of welding generator. Wilson Welder & Metals Co., 60 E. 42nd St., New York.



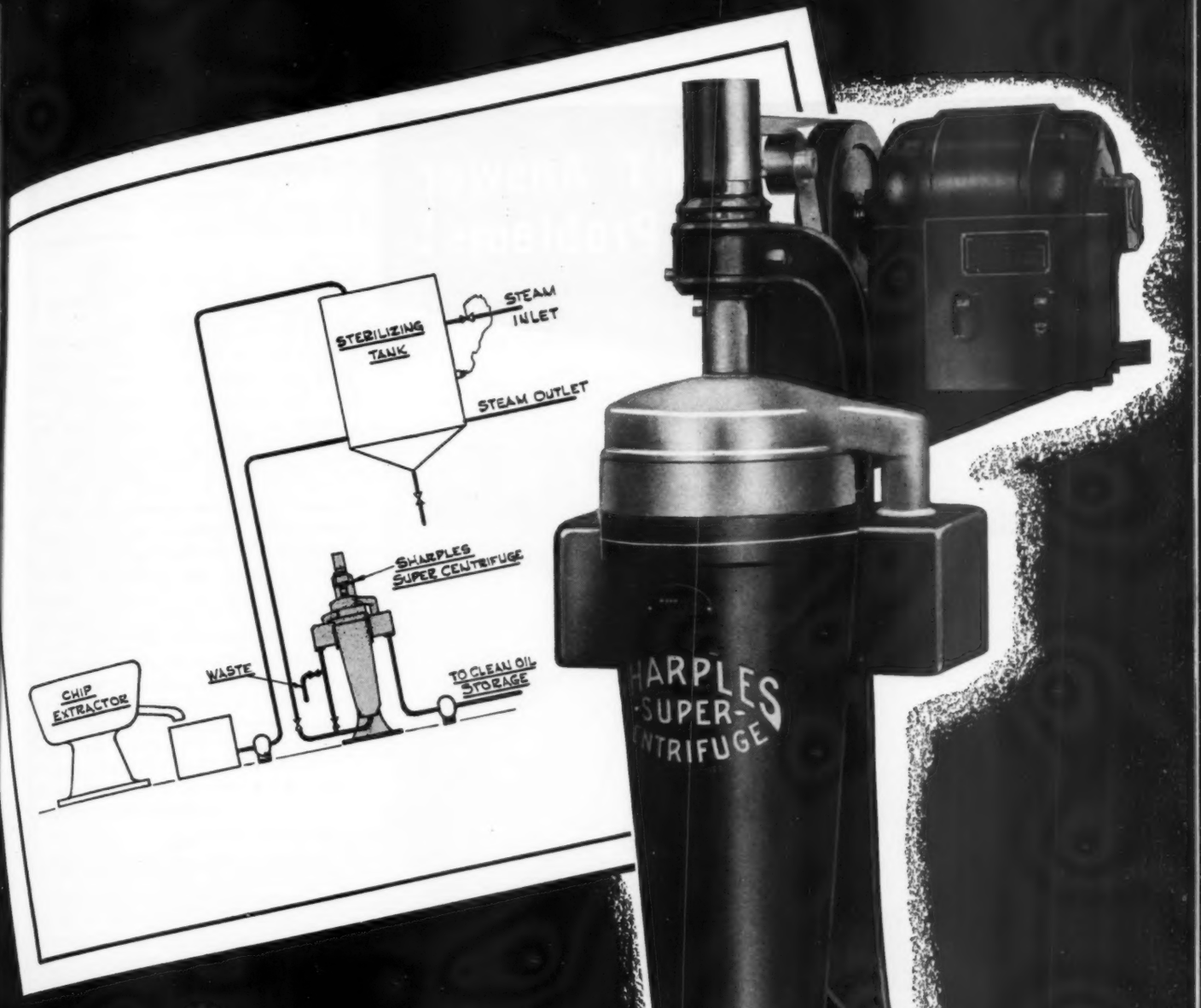
Fluorescent Ballast

Announcement is made of the Acme Model F100-25 lamp ballast for four 100-watt fluorescent lamps. The manufacturers claim that it provides equalized and balanced secondary voltage to each lamp, with no drag, delay, or flashing.

Core and coil elements are impregnated and compounded to minimize resonant vibration, thus reducing the sound level. Acme Electric & Mfg. Co., Cuba, N. Y.

Eye Shields for Women

Lightweight eye shield, known as Stasafe, has a quarter dome head shield made of fiber, which provides a certain amount of hair protection. Headgear can be supplied with a leather sweatband or cellulose sponge. Also available without the quarter dome protection. Entire front can be raised or lowered conveniently. Standard Safety Equipment Co., 232 W. Ontario St., Chicago.



A typical layout of a Sharples Vaportite Super-Centrifuge fitted to a batch purification system.

A No. 16 Vaportite type Super-Centrifuge.

THE SHARPLES CORPORATION

SHARPLES

Representatives throughout the world

★ *CENTRIFUGAL AND PROCESS ENGINEERS* ★

2300 WESTMORELAND STREET · PHILADELPHIA · PA.

LONDON PARIS

NEW YORK BOSTON PITTSBURGH CLEVELAND DETROIT

CHICAGO DALLAS SEATTLE SAN FRANCISCO LOS ANGELES

The PERMANENT Answer to Your Caster Problems!

One of the great advantages of Darnell Casters is the permanency of service that goes with them. Maximum savings and efficiency is assured every user — yes, it's a Darnell guarantee that gives complete satisfaction.

DARNELL CORP. LTD., 60 WALKER ST., NEW YORK, N.Y.
LONG BEACH, CALIFORNIA, 36 N. CLINTON, CHICAGO, ILL.

FREE Manual FOR THE Asking

Canada's Manpower Control

(*Continued from page 84*)

work is less directly contributing to war or civilian needs.

Those in group *D* will have no labor priorities and are concerns engaged in non-essential activity in time of war.

Reclassification of industries is provided for as less essential and non-essential firms obtain war work, the Department of Munitions and Supply immediately notifying the local national selective service office of the war work contract, and the concern having the contract advising the office who its subcontractors will be.

Since late in 1940 the Canadian Department of Labor, in cooperation with the provinces and industry, has been training men and women for employment in war industries. Subsistence pay is given such trainees who are placed in war industries after their successful completion of the course. Over 100 technical schools throughout the Dominion are being used for this work, while industry is training workers in its factories.

Government Reconditions Men

The government is also undertaking an extended program of reconditioning men to fit them physically for military service, whether the men are drafted or volunteer. The service is free, with subsistence pay.

Canada's present manpower regulations did not come into existence all at once this fall. For the past two years they have been gradually put into force by (1) restricting certain occupations for men in certain age groups; (2) making a roster of all professional engineers and science workers and keeping strict tab on their movements through the Wartime Bureau of Technical Personnel; (3) establishing unemployment insurance and listing all employees and employers with the Unemployment Insurance Commission; (4) registering all unemployed and retired men, and all younger women. The National Selective Service Board replaces previous government employment offices and unemployment insurance offices.

The need for 250,000 more men and women in the armed services and war industries by the end of 1942 brought to a head all the manpower regulations and stabilized all workers in their jobs on September 1. At that date Canada had more than 500,000 men in the armed services, over 800,000 in war industries, 1,350,000 on

In shipyards, too
COMPETITION FORCES OUR HAND

Everywhere you look in shipyards today, it's weld, weld, weld. Why the sudden, complete change to arc welding?

ALTER EGO: *Competition!* We were competing with enemy subs and bombers and they *forced* us to build good ships *faster*. We were *forced* to change to arc welding to beat the Axis competition.

Arc welding IS building ships faster, all right—more than twice as fast as the old method . . . just as it's speeding construction of tanks, planes and guns—making them better, too.

ALTER EGO: So look out now for the post-war Battle for Business. Competition will again force change to arc welding to produce better and cheaper autos, home appliances, houses, bridges and other products. We can be forced to change or we can be ready.

Let's put our designs on the alert now with arc welding so we'll get a head start on our competitors.

Ask *your* inner self if competition doesn't force *your* hand.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

Industry is meeting the threat of sabotage with good, sturdy fence

WHEN war came to America, thousands of plants were already prepared to ward off the vicious attempts of spies and saboteurs with high barriers of steel — U·S·S Cyclone Fence. And since the war began, mile after mile of this sturdy fence has been built to protect war plants, shipyards, airfields. Vital areas within many plants have been given extra protection by enclosure within partitions of steel mesh.

How well is your plant fenced? Is it completely enclosed? Would a few feet placed around special equipment or danger points make your plant more secure? In spite of limited supplies and huge demands, we can provide the fence you need if you have the proper priority ratings. We'll help you choose the right fence for the job. And we'll erect it for you if you wish. Write for a free estimate.

CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Waukegan, Ill. · *Branches in Principal Cities*
United States Steel Export Company, New York

USS **CYCLONE FENCE**

UNITED STATES STEEL

32-Page Book on Fence

Send for our free book that tells all about fence. Crammed full of facts, specifications and illustrations. Shows 14 types—for home, school, playground, and business. Buy no fence until you see what Cyclone has to offer.

CYCLONE FENCE
Waukegan, Ill., DEPT 9112
Please mail me, without obligation, a copy of "Your Fence—How to Choose It—How to Use It." I am interested in fencing: ☐ Industrial; ☐ Estate; ☐ Playground; ☐ Residence; ☐ School.

Approximately _____ feet.

Name _____

Address _____

City _____ State _____

the farms, 300,000 employed in essential utilities and mining, and 2,000,000 employed in civilian industries. Thus about 5,000,000 of Canada's total 11,500,000 people were working. There were but 80,000 men between 16 and 69 unemployed, few of whom could be employed in war industries and a quarter of whom were unemployable. Canada's remaining source of labor consisted of the 2,000,000 in civilian industries and the Canadian women. More and more women are being urged into industry, and registration of younger women will enable the National Selective Service to steer these women into war industries to replace men for military service and to meet expanding labor needs. Of the 250,000 men and women needed by the end of the year, 100,000 are for the armed services and 150,000 for war industry.

To make sure that employers and employees will obey the new manpower regulations, the regulations contain a $500 fine, 12 months' jail term, or both, for willful violation of the regulations.

The Lunch Hour Follies for War Workers

(*Continued from page 91*)

months ago, one of Hollywood's and Broadway's favorite actresses, Aline MacMahon, set about doing a thorough job of research into the English plan and into the possibilities of an American program of similar scope. In the course of this extensive research Miss MacMahon discovered from the Labor Division of our own WPB that here, too, there was a real economic need for entertainment in the factories; that figures on accident and sickness had reached dangerous levels, with a consequent loss in productivity. Equipped with facts, figures, and precedent, this earnest actress brought her research and ideas to the American Theatre Wing War Service, a non-profit organization representing every phase of the radio, screen, and legitimate theater. The Wing's activities are manifold, but chief among these has been the establishment of stage-door canteens for our armed forces in New York, Hollywood, Philadelphia, and Washington, with others in the process of being organized in other cities.

And so, today, another project of the Theatre Wing is the Lunch Hour Follies, designed to bring entertainment into the factories during mealtime periods. Through the medium of

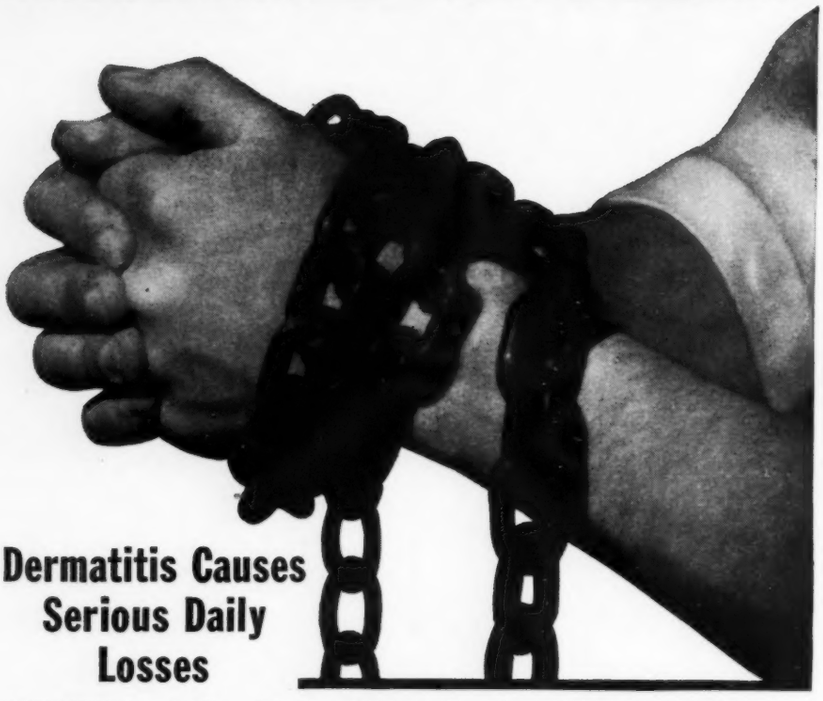
IS PAVED WITH SCRAP

This is a *must* . . . the urgent problem is more and still MORE scrap iron. Steel plants need MORE—because manufacturing plants need MORE steel—because the armed forces need MORE weapons to speed Axis surrender. ¶The situation is critical, the time is now. It calls for America's top resourcefulness, energy and executive skill. It takes cooperation from every industrial worker, every industrial plant, every civilian. ¶Your nearest salvage collector will buy your scrap iron and move it to the steel mills. Every pound will help secure the homes, lives, and future of all of us. Every pound will bring the Nazi-Nippon "Kamerad" nearer!

THE OHIO SEAMLESS TUBE COMPANY SHELBY OSTUCO OHIO

(This advertisement is available as an enlarged poster, 19"x24", without our bottom signature, for use in your plant—to help your local scrap drive.)

LIKE CHAINING THE HANDS OF THOUSANDS OF WAR WORKERS



Dermatitis Causes Serious Daily Losses

120,000 Lost Man-Hours If Only One in a Thousand Affected

Hands that cannot work because of Dermatitis might as well be chained. The result is the same—loss of vital War production. Plant managements, industrial plant physicians, Army and Navy officers in charge of getting War Production out,—know that Dermatitis is a common cause of absenteeism,—and physicians agree that adequate *sanitary washing* is an important step in keeping Dermatitis under control.

Clean running water for each of 8 to 10 persons simultaneously. A first step in Dermatitis prevention.

Bradley Group Washfountains provide what thousands of plants claim to be the best and safest facilities. They serve a group of 8 to 10 persons simultaneously, each with clean *running* water with no chance of contamination because the deep bowl is self-flushing to prevent collection of used water.

Lost hours are reduced and less time is required by the workmen with Bradley Washfountains, both of which increase essential output per man.

Bradleys save critical materials—bowl and pedestal are of precast stone. Piping connections are cut 80 per cent because a Bradley serving 8 to 10 persons has only three piping connections whereas "single-person" wash basins to serve the same number require 24 to 30. The time and labor for installation are both radically reduced as well as the janitor and maintenance work. To prevent delays in washrooms and to reduce spread of Dermatitis and absenteeism, install Bradley Washfountains. Write for illustrated Installation Booklet . . . BRADLEY WASHFOUNTAIN CO., 2215 West Michigan Street, Milwaukee, Wisconsin.

BRADLEY *washfountains*

the Lunch Hour Follies, important men and women of the stage, screen, and radio—among them such top people as Moss Hart, George S. Kaufman, Harold Rome, Kurt Weill, and J. P. McEvoy—have whipped up sparkling variety shows that act as sure-fire tonics to the spirits of tired men. The talent throughout is of a high professional standard; the people engaged in this patriotic work think only in terms of what they can give, not what they can get.

Entertainment With a Moral

Although the shows are predicated on their entertainment value, the material for the Follies deals with specific problems faced by plant management, such as absenteeism, lateness, accidents, war consciousness. An instance of the successful illustration of plant problems through the medium of entertainment can be seen in Harold Rome's song, "On Time," written by special request of plant managements which had found lateness to be a real problem. "On Time" sung as part of a Lunch Hour Follies program by an attractive blues-singer, paints a picture of the kind of man who is worth while as opposed to the kind of man who is always late. Song and delivery proved tremendously successful, both as entertainment and as a help in combating a serious plant problem.

The Lunch Hour Follies is prepared to offer programs ranging from 15 minutes to 50 minutes, depending on the needs of the plant and the time available for mealtime. Because very often there are limited facilities for such type of entertainment, the program has been designed so that little is required of the plant in the way of prior preparation.

No Profit for the Actors

Since there is no thought of personal profit in this project, the Follies has geared its operation to provide for a nominal payment from those being serviced to assure that this work will continue. On this basis the Follies is prepared to deliver a program at regular intervals, at any hour of the day or night, to any plant desiring this service. The sole interest of the Lunch Hour Follies is a desire to utilize the imagination and ingenuity of show business toward helping maintain and stimulate production.

At the present time, the Lunch Hour Follies is working intensively on the Eastern Seaboard and has completed plans to open a West Coast branch of the organization which will shortly start servicing war plants in that area. Eventually the Follies expects to be geared to service plants anywhere in the country.

Miss War Worker Designs Her Own Work Clothes

(*Continued from page 99*)

makes the soldier quite sure that his troop is the best in the whole army, in battle or on the parade ground.

This is the spirit Sperry wants to inculcate in its employees. It is to develop this spirit that it wanted its girls to be proud to wear their uniforms both in and out of the plant.

The next step, therefore, was to employ a woman who could do this job of coordinating what the girls themselves really wanted in safety apparel. The mechanics of this discovery were fairly simple. At each time clock a notice was posted, asking that any girl interested in having a voice in choosing Sperry uniforms sign her name on a slip of paper, and deposit the paper in a box placed there for that purpose. From these names groups of 24 to 36 were selected at random from each of the Sperry plants.

A great many manufacturers of women's uniforms, housedresses, overalls, and work clothes were invited to send in samples of their products. These garments were put on hangers around the room. The girls who had been selected as "juries" were called together, told to get into anything that fitted them, show the clothes to the other girls present, so that everyone could comment on them and make suggestions.

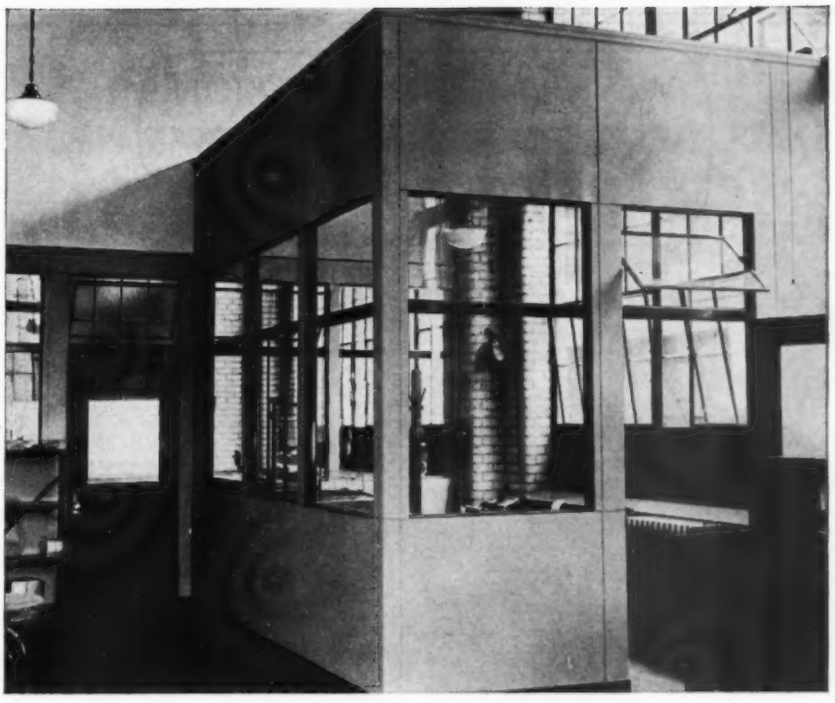
Seventeen such groups were called together from the various plants and departments. From their combined opinions a set of 34 specifications was drawn up. The specifications were sent to Vera Maxwell, nationally famous designer of women's sportswear, to be made up into uniforms.

Uniforms Were Tested

Then came a period of testing. Uniforms were made up in different colors and materials, and six girls chosen to wear them, wash them, give them the "works." From the result of this final test came the decision. To supplement the uniforms, coats for street wear are being designed in the same colors.

Three uniforms and a hat are given to each girl. Coats are sold at cost—but there is no compulsion to buy.

Hats are designed for double duty. They were designed by Sally Veetor, well-known milliner, assisted by the Sperry women's committees. These hats can be worn in the shop as a safe head covering. Then, with a flick of the wrist, they can be converted



When plant offices are needed FAST!

FOR SPEED WITHOUT COMPROMISE ON QUALITY, specify J-M Transite Walls for plant office construction. These modern movable partitions are ideal for plant offices, because they go up in a hurry . . . and they provide long life with low maintenance. Here are other important advantages:

RELEASES CRITICAL WAR MATERIALS. Transite Walls are made of two plentiful materials—asbestos and cement.

RAPID INSTALLATION. A patented construction method makes this possible without work interruption. Relocation possible with 100% salvage.

FIRE-RESISTANT, STRONG. Asbestos-cement cannot burn. And Transite Walls easily stand up against all kinds of customary factory shock and abuse.

FORMS ANY TYPE PARTITION. Ceiling-high, free-standing, solid or in combination with glass.

ATTRACTIVE APPEARANCE. Natural, light-gray color just right for plant or general office use. Finish is permanent. Requires no painting, but may be waxed or painted if desired.

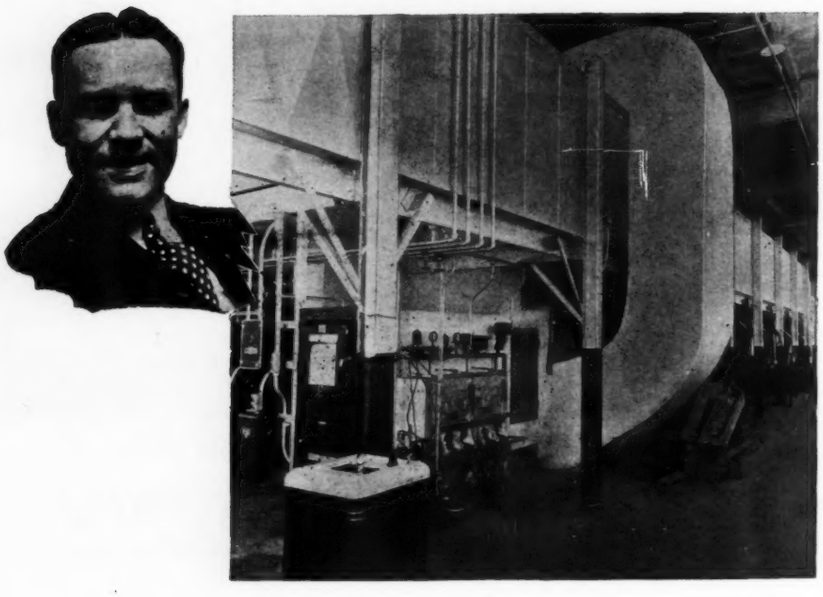
•

For details on J-M Transite Walls, see our Catalog in Sweet's or write for brochure TR-22A. Johns-Manville, 22 East 40th St., New York, N. Y.

JOHNS-MANVILLE

Transite Movable Asbestos Walls

WE HAD A PRODUCTION BOTTLENECK TOO! IT WAS DRYING!!



"we licked our problem —and saved money, too!"

ROSS INDUSTRIAL OVENS AND DRYERS

"Our drying cycle was too long. We were being slowed up at our ovens. No space for additional ovens. Ross engineers solved our problem. By changing our basic method of heating, giving us higher and more uniform, controlled temperatures in a leak-proof, insulated panel oven, we have greatly reduced processing time, increased output without additional ovens—and reduced our fuel and operating costs as well."

Ross Ovens and Dryers have solved many problems like the one described above—with better quality of output, absolute safety, perfect control and greater flexibility.

AIR FOR YOUR PROCESS 0° TO 1000°

Write for our Descriptive Bulletin No. 130

J. O. ROSS ENGINEERING CORPORATION

Main Office — 350 MADISON AVE., New York, N. Y.

201 North Wells St. CHICAGO, ILL.

12253 Greeley Ave. DETROIT, MICH.

ROSS ENGINEERING OF CANADA, LIMITED, Dominion Square Building, Montreal

into street-wear turbans that the girls really enjoy putting on.

All safety clothing—gloves, shoes, aprons—has gone through the same process of being selected and designed by the girls themselves. Not a stitch is taken, not a button changed, without telling the girls what is being done, and why.

Does this seem like a lot of trouble and expense? As morale is an intangible, so is it impossible to gage whether the money expended to encourage it is well spent. Sperry feels, however, that it is one of the ways to get what it wants most—output that will win the war.

What Small Plants Can Do to Get War Orders

(*Continued from page 103*)

such a survey should contain in order to be thoroughly informative:

SURVEY OF.....

LOCATION OF PLANT

Town; street address.

MAIN OFFICE

Town; street address.

OFFICIALS, OWNERS, or PARTNERS

Names; titles.

OFFICIAL CONTACT(S)

Names; titles.

TELEPHONE NUMBER OF OFFICIAL CONTACT(S)

(It is sometimes advisable to give phone number as Blank 7-000, Extension 000. If this is the case, school your operator thoroughly on how she shall handle calls for extension 000.)

FINANCIAL REFERENCES

Thomas's rating; other rating; bank references; credit reference.

EMPLOYEES

Direct labor; indirect labor; skilled employees; unskilled employees; semi-skilled employees; number of tool-makers; number of aliens. (It is most important that you list number of aliens correctly. Have ready and be prepared to give a separate list showing name of each alien, whether he has or has not his first papers, and his country of origin. Keep your file of aliens up to date, up to the very minute; it is better to have the infor-

CUT THIS OUT AND PASTE IT NEAR YOUR AIR COMPRESSOR

• • • AND FILE THIS AWAY FOR REFERENCE

To keep your Gardner-Denver air compressor at peak efficiency

1

Keep crankcase filled to proper level with high-grade engine oil, changing oil after every 200 hours.

2

Use only the best grade of air compressor oil for lubricating compressor cylinders.

3

Clean intake air filter at least once a week.

4

Test safety valves daily to prevent sticking.

5

Drain condensate from intercooler every day.

If you are looking for better—smoother—air compressor performance, remember these facts about a Gardner-Denver "RX" Compressor:

1

Dirt-free construction for longer compressor life and low maintenance.

2

High efficiency—due to better design which allows large and unrestricted valve and port areas. Extra large water jacket for better cooling.

3

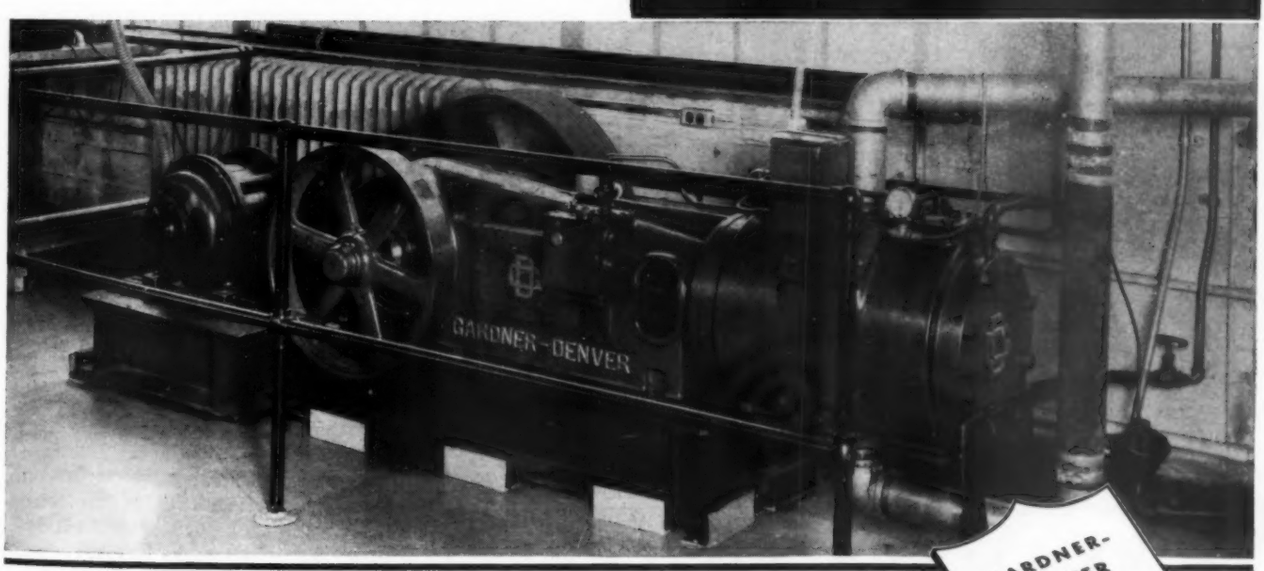
Efficient automatic capacity control—to fit air output to air needs.

4

Air-cushioned, silent, Duo-plate valves that actually get tighter with use.

5

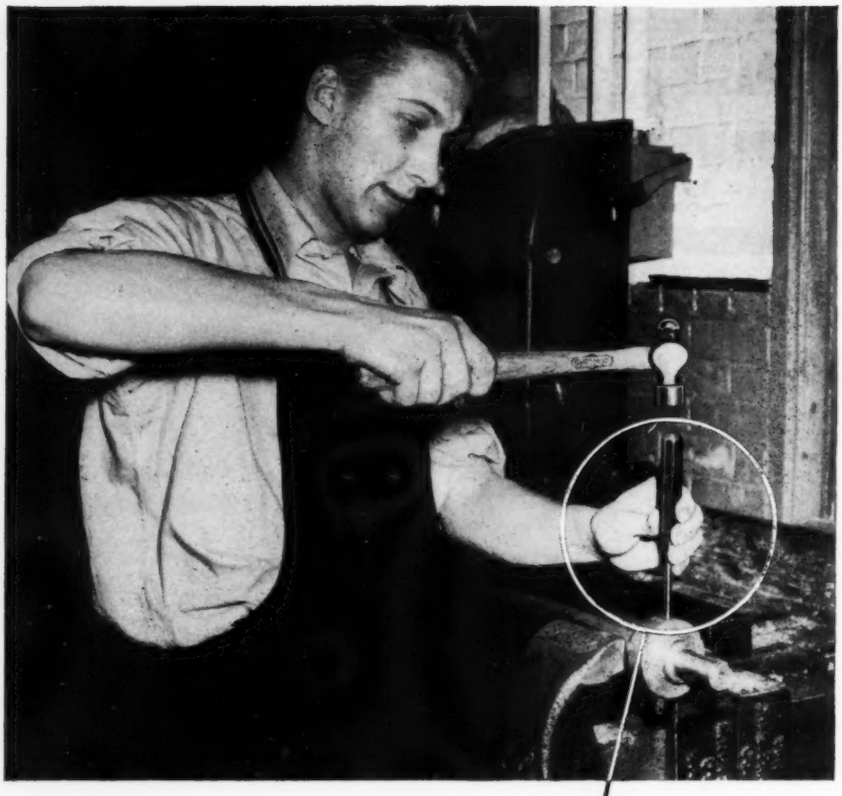
Sized for a wide variety of needs—capacities from 89 to 1292 cubic foot displacement per minute.



GARDNER-DENVER PRODUCTS KEEP SPEED V ICTORY

For complete information, write Gardner-Denver Company, Quincy, Illinois

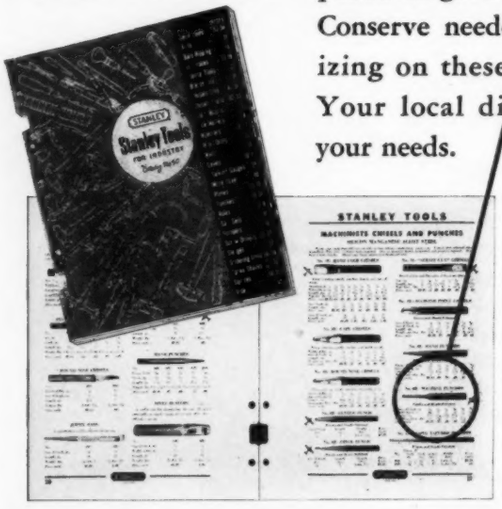
GARDNER-DENVER *Since 1859*



ON THE JOB...*LONGER!*

STANLEY MACHINISTS' CHISELS AND PUNCHES

Offer far greater work-value. Drop forged from tough alloy steel, hammer drawn, oil hardened and correctly tempered to give a tough cutting edge. Conserve needed metals by standardizing on these longer-service tools. Your local distributor will supply your needs.



A Complete Line of Tools under each Index Listing

Here's the top reference book for fine hand tools – Stanley Industrial Tool Catalog No. 50. Keep a copy at hand.

STANLEY
Trade Mark

STANLEY TOOLS
DIVISION OF THE STANLEY WORKS
151 Elm Street, New Britain, Connecticut
THE TOOL BOX OF THE WORLD

mation and not need it than to need it quickly and not have it.)

PRESENT OPERATING BASIS

Number of shifts; hours per shifts; days per week; total hours production per week.

TYPE OF PRODUCTION

What you have made—name articles and cross index to prints or preferably photos. Show tolerances and mark outstanding difficult operations. (Be sure the operation is really outstanding and/or unusual.)

DEPARTMENTS

Departments of plant; engineering and/or design; machine; inspection. (Don't list a department which is only a name on an organization chart.)

MONEY VALUE OF PRODUCTION

Normal $.....; wartime $..... (Be honest–someone may check your statement.)

SUMMARY OF EQUIPMENT

Lathes; drill presses; power presses; millers; turret lathes; automatic screw machines.

TOLERANCES

Normal; minimum.

PRECISION MEASURING

List in detail. (Keep in mind you can't work closer than you can measure.)

CUSTOMER REFERENCES

Name: (list every firm for at least the last 2 years).

Plant address; town; street address; official contact (name and title of individual to address and his telephone number). In each case, state if you think the purchaser was well satisfied, satisfied, or dissatisfied. Again, be honest. It will be better for you to admit dissatisfaction than to have it otherwise found out and possibly–yes probably–magnified.

PLANT DESCRIPTION

Describe plant; type of building; construction; condition; automatic sprinkler system (if none, say so) and/or fire protection; elevator; protection or possibilities of protection from sabotage (inside or outside); possibility of air raids; lighting conditions; ventilation; and facilities for employee comfort. (Include photos to substantiate your word pictures. Also include diagram of your plant layout. Further, include a sketch of the location of your plant with reference to

OEM Photo by Hollem

NOW YOU MUST LEARN "HOW-TO-DO-IT"

BETTER..CHEAPER..WITHOUT WASTE

CAN YOU USE HELP?

We have available a new motion picture and a booklet (soon off the press), both on "*Stainless Steel Welding.*" Also for your production men, a complete "*Handbook of Special Steels.*" For your engineers, certified "*Blue Sheets*" on each tool and stainless grade. For your apprentice or training courses, "*Elementary Discussions on Tool and Stainless Steels.*"

● Write for the informational help you need. In addition, the personal assistance of our Technical Staff is at your call.

PRODUCING constantly improved war goods at a diminishing rate of cost, and an increasing rate of speed, ordinarily wouldn't be much of a trick for America. It's right up our industrial alley.

But conditions today are not as usual. There is no inexhaustible ocean of materials. There is, instead, a controlled stream flowing through rigidly restricted channels. We have to do *more*, actually, with *less.*

Thrift is especially essential with the vital steel alloys. If you use alloy steels in *any* form, check your dies, your cutting tools and machine set-ups, your heat-treat and welding methods—check and recheck every operation to reduce rejects, spoilage, undue scrap, or any other form of waste. Above all, carefully segregate and classify your unavoidable alloy steel scrap (*that is the only way the mills can reclaim it*) and rush it back into the useful cycle.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

A-8685-1

PROMPT DELIVERY!

Efficient Conveyor Belts! Elevator Belts!

KEYSTONE CANVAS STITCHED

For Medium and Heavy Duty. Low first cost and maintenance make Keystone an ideal conveyor belt. Three types to fit almost any conveying job.

BLACK—for hot material and general use.
WHITE WAX—for special or sanitary conveying.
UNTREATED—for dry, light duty.

VEELOS BALATA

For Hard Service and Severe Conditions. Made from selected long staple cotton duck, impregnated with best quality Balata gum. Plies are so powerfully welded together that belt is practically homogeneous in construction. Veelos Balata is tough, durable . . . provides maximum strength and minimum stretch.

These belts are serving as highly satisfactory alternates for rubber conveyor belts. Available immediately from the factory. *Write for complete information and prices.*

MANHEIM MANUFACTURING & BELTING CO., Manheim, Pa.

Also manufacturers of

Only Veelos—the link V-Belt—is quickly adjustable to any length . . . adaptable to any drive! Write for full facts about the amazing production advantages that only Veelos V-Belt provides.

VEELOS V-BELT
ADJUSTABLE to any length
ADAPTABLE to any drive

some well-known point, nearest public transportation, nearest freight house and/or wharf, and most convenient direct route to main trucking highway.)

SHIPPING

Describe available means of shipping by truck, rail, water, and air.

LABOR

Describe labor situation—union or open shop. Availability of help, prevailing rates of pay; how employees reach shop (transportation); methods of accident prevention and safety record.

LENGTH OF EXPERIENCE

Age of business and where incorporated. Previous addresses (if any).

CAPABILITY OF MANAGEMENT

Tell about the officials by name and outstanding employees by title. Show education and experience for officials and key men. For outstanding employees show ability to adapt old machines to new jobs.

NEW EMPLOYEES

Describe how you expect to train new employees.

DELIVERIES ON SCHEDULE

Describe your system to insure delivery as per contract.

DETAILED MACHINE LIST

List, in detail, your machine tools and processing equipment. Group together various types—millers, lathes, turrets, automatics, etc. The following headings should be helpful: Quantity; machine; make; size and model number; normal tolerance; approximate age; condition; complete specifications and/or description.

(Guard against any possibility of a misunderstanding. 1 screw machine, B&S #00 automatic, etc., is good, but 1 screw machine, B&S #00, ⅜" bar capacity, automatic, etc., is better. Few machines are in excellent condition. Rarely are all machines in the same condition. Be consistent in the relationship of your listing of tolerance, age, and condition. Don't specify a machine has been rebuilt if you mean reconditioned. Don't use either expression if you can verify only prudent maintenance. In the column, "Complete Specifications and/or Description," it might be possible to refer effectively to the use of this machine in making one of the articles listed under "Type of Production." In a separate section, do list special attachments to your machine tools. Don't list vises, bench space, anvils,

use emergency motor power NOW

. . . and save critical materials!

In peacetime, motors are applied with a substantial reserve safety factor. In other words, most applications are "overmotored" . . . the motors are capable of producing more horsepower than is required by the machines they drive.

Such "overmotoring" provides a reserve to take care of unexpectedly heavy loads, and assures long life with low maintenance cost.

But today, our problem is to "make the most of what we've got"—to get more production out of each and every motor—and to save critical materials.

Recognizing this fact, Westinghouse, at the suggestion of the War Production Board, now recommends that motor users modify their peacetime practices . . . that they get the most out of every motor they have . . . that in applying new motors or relocating old ones, they take advantage of all possible favorable operating conditions . . . that they load each motor to the limit.

J-21255

for THIS LOAD	*use* THIS RATING	*instead of* THIS RATING	*save these* MATERIALS
hp	hp	hp	lbs.
1.25	1.	1.5	36
1.88	1.5	2.	14
3.75	3.	5.	19
6.25	5.	7.5	63
9.38	7.5	10.	80
25.	20.	25	106
37.5	30.	40.	186
62.5	50.	60.	320
125.	100.	125.	550

Recommendations in this table apply to open-type A-C motors, 40°C rated, in applications seldom reaching or exceeding this temperature

Westinghouse

SEND FOR THIS BOOK

Today A summary of Westinghouse wartime motor recommendations is presented in the booklet "Calling All Horsepower."

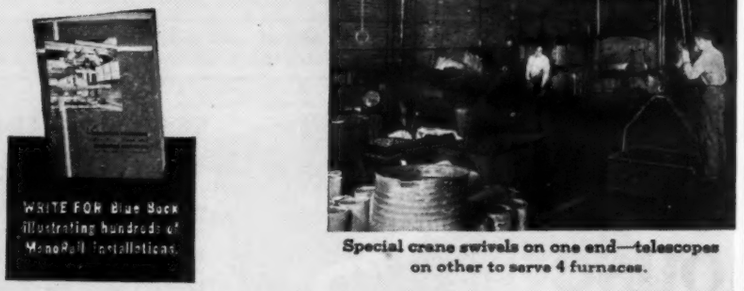
Write today for your free copy. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

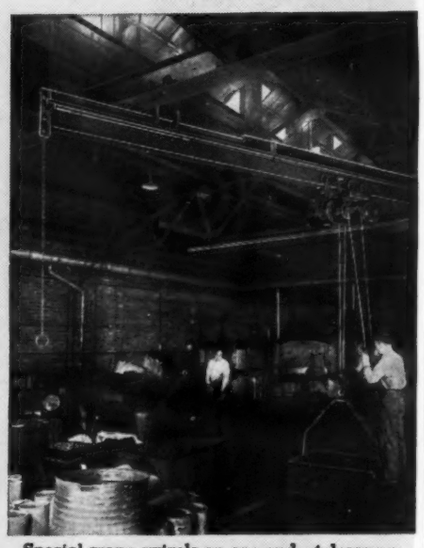
★ Too much lifting and carrying of heavy loads means "too little" production and "too late" delivery.

American MonoRail Overhead Handling Equipment will eliminate delays in your production — from unloading raw materials to loading your finished products. In every operation where handling is involved, American MonoRail Engineers have been able to speed up production by eliminating delays, relieving skilled labor from lifting and carrying, reducing accidents, conserving energy and increasing efficiency.

American MonoRail Systems are playing a vital part in speeding up production in hundreds of plants engaged in war work. Supplied for manual, electric or automatic operation. There is no interruption during installation. Call in an American MonoRail Engineer — he will show you how it can be done in your plant.

Simple MonoRail loop provides quick handling through heat treat operations.





Special crane swivels on one end—telescopes on other to serve 4 furnaces.

THE AMERICAN MONORAIL CO.

13114 ATHENS AVENUE ★ ★ CLEVELAND, OHIO

shafting, etc. An attempt to "gild the lily" won't help your case.)

LIST OF ALIENS

(Purposely, this is put at the end because of the greater possibility of frequent change.) Name; citizenship papers; country of origin. (If you are doing war work, perhaps your alien employees have been approved by some government agency. If so, make a fourth column entitled "Approved By" and show War Department, U. S. Air Corps, or whatever.)

Having amassed this information, what will you do with it? Don't have the report printed; later there may be changes that you will want to make. Don't have it mimeographed; that is merely adding an invitation to file the report in the nearest wastepaper basket. Don't dress it up with a fancy layout and pink ribbons. Do have each copy individually typed on good paper (or prepared so that it looks like an individually typed copy). Remember that the impression made by the survey is the impression of your plant. Do make the report connected, simple, and easy to follow. It is the first indication of your ability to do a job well.

You will then be ready to seek contacts. First a copy of your survey should be filed with each of the federal government procurement agencies and corresponding agencies for your state, county, and local community. (Don't overlook the possibility that some of the usual sources of supply for the latter agencies may no longer be available.) If you are not acquainted with the addresses of the federal procurement agencies, for information write to:

1. War Production Board, Washington, for the address of the nearest field office.

2. Office of the Under Secretary of the War Department, Washington, for a copy of "Army Purchase Information Bulletin" which contains the addresses of various procurement agencies.

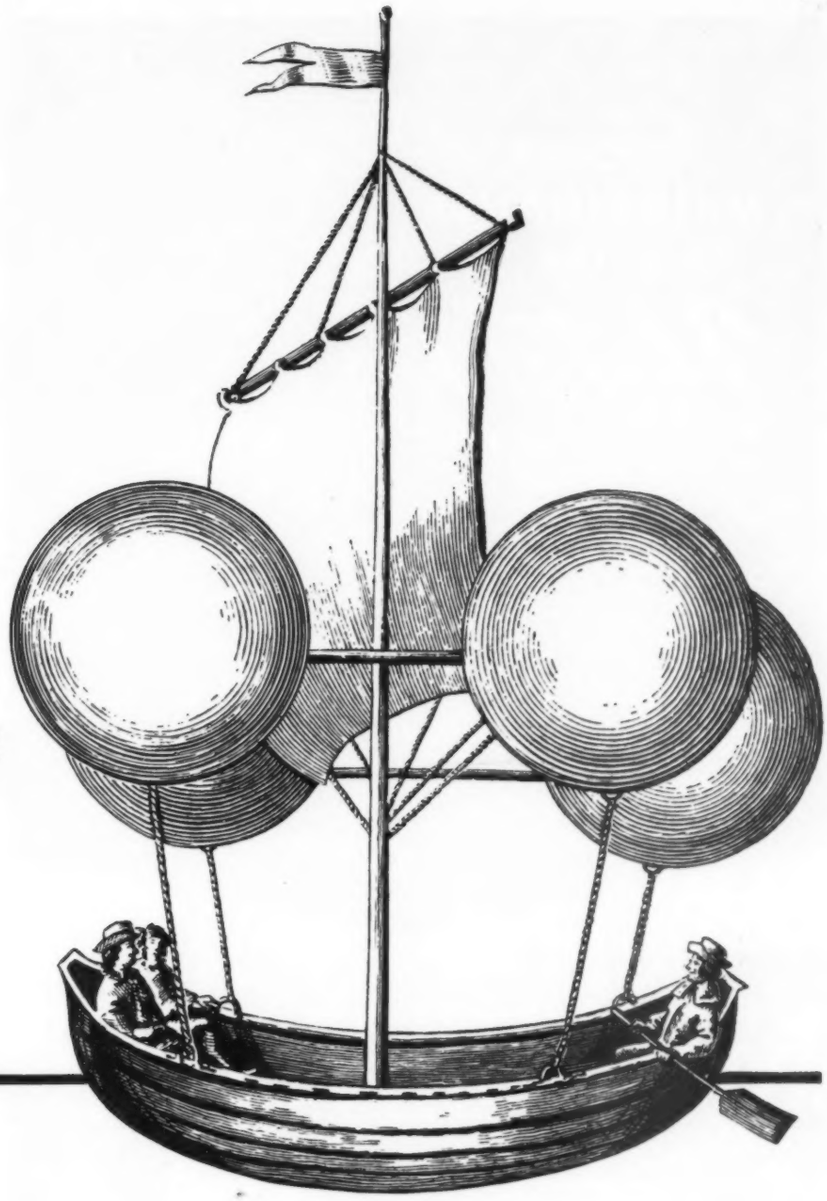
3. Bureau of Supplies and Accounts, U. S. Navy, Washington, for a copy of "Selling to the Navy."

4. The Procurement Division, U. S. Treasury Department, Washington, for the address of the nearest field office.

5. The United States Maritime Commission, Washington, for the address of the nearest field office.

Some of the federal procurement agencies may give names of prime contractors and information about future procurements; other agencies are prohibited from doing either. All the agencies maintain suitability files of

Every new idea may not click...



—but those that do make history!

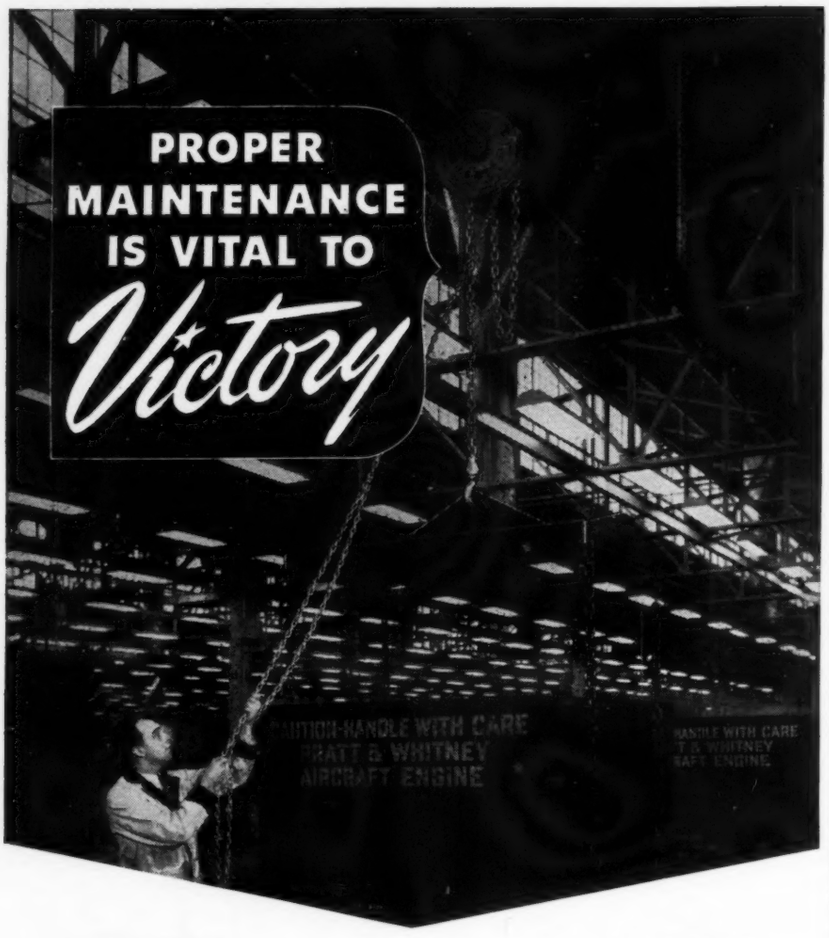
Shell men may not ring the bell *every* time they advance an idea, but their practical suggestions *have had* real dollars-and-sense value to manufacturers in dozens of different industries. Time and again their suggestions have been the starting point for increased production, longer machine and tool life, improved product finish.

Take the case of the manufacturer who is machining gears for army tanks... By using Shell's improved method of balanced lubrication, gears were turned out 50% faster; finish was improved. And this was accomplished without the purchase of any new equipment.

Because you are looking for worth-while ideas like this, why not "talk it over" with the Shell man? Call him in today.

SHELL LATA OILS *for Cutting*

SHELL



WRIGHT *Improved High Speed* **HOISTS**

ARE FAMOUS FOR THEIR ABILITY TO STAND ABUSE—HELP THEM TO TAKE IT NOW—PROTECT THEM

The No. 1 precaution is: ***Don't Forget the Grease Gun!*** A busy **WRIGHT HOIST** needs thorough lubrication once a month. Keep your load chain well lubricated, too.

Wright's No. 2 precaution is: ***Don't Overload Your Hoist.*** Watch both the top and bottom hooks if in doubt about the carelessness of workmen. Wright hooks are drop-forged from special steel which, when overloaded, give visible warning by slowly opening. Wright load chains are also high in elastic limit. Don't continue to use hooks or chains that have stretched.

Take proper care of your **WRIGHT HOIST** so that it lasts. Where properly lubricated and maintained, many **WRIGHT HOISTS** have given continuous, trouble-free service for 20 to 25 years. You can find the name of your nearest Wright distributor in the telephone book.

WRIGHT MANUFACTURING DIVISION
York, Pa., Chicago, San Francisco, New York
In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

possible contractors or subcontractors for various items.

In addition to the federal agencies, names of contacts may be possibly secured from (a) business directories at your public library; (b) your local chamber of commerce; (c) firms whose business is to compile lists of names; (d) by a study of your newspaper whose news items often tell what firms are engaged in war work, and whose classified advertisements are the key to the type of work in which a defense plant is engaged.

In general, such names are suitable, as far as the small manufacturer is concerned, only for a mail approach. The results of this approach depend a great deal on the law of averages—that is, the more letters mailed, the greater the possibility of a suitable response. Direct-mail advertising is a specialized field. Best results can be expected through the employment of experts.

For names to be personally contacted, usually the best sources are:

1. Firms with whom you are doing or have done business. Find out with whom they are doing business or whom they may know who is doing war work. Show them your plant survey and press for a favorable comment. Then ask for an introduction to some one you know your man knows.

2. The bank with whom you do business. Proceed similarly as you would with a firm with whom you are doing business.

3. Your local chamber of commerce, Rotary, Lions, Kiwanis clubs, American Legion, Veterans of Foreign Wars, fraternal organization, or church. From such sources, you can get the names of individuals who may have responsible positions and through mutual friends perhaps you can arrange an introduction.

There is an old axiom: "Don't send a boy to do a man's job." Don't send your bookkeeper to interview a production engineer or your shop foreman to discuss financial details.

There is work to be done and there is a place for you. But it is up to you to find that place, Mr. Little, so *plan wisely and then follow your plan.*

Significant Labor Developments

(*Continued from page 109*)

2. As between feasible alternative plans, that plan should be adopted that will result in the least burden on employees.

3. Savings resulting from the ap-

Meet the urgent need to produce MORE with LESS with the "Know-How" of the

Disston Conservation Control Cards contain such data as Typical Troubles and Failure to Achieve Proper Performance; Cause of the Trouble; Correction; and Recommendations for Various Materials to be Cut.

DISSTON CONSERVATION CONTROL PLAN

CONSERVATION SERVES EVERYONE

THE basic principle of good manufacturing practice is getting the very most out of what you have to work with . . . time, tools and materials. Using the best equipment obtainable and keeping it working at maximum efficiency are vital duties today.

The Disston Conservation Control Plan has been devised to meet these urgent wartime demands. The fundamental purpose of the Plan is to help industries turn out *more* and better products—with *less* lost time, *less* tool breakage, *less* waste of essential supplies.

The "Know-How" to do this is contained in Disston Conservation Control Instruction Cards—providing specific information on the most efficient use and care of 34 different types of cutting tools. Many of the nation's leading manufacturers report these cards exceptionally effective in saving tools—in simplifying and multiplying supervision—in speeding training—in making the most productive use of time, effort and equipment.

Nearly three-quarters of a million Conservation Control Cards are in service throughout American industry. They are available to *you* without cost or obligation. For complete information write today to Henry Disston & Sons, Inc., 1124 Tacony, Philadelphia, Pa., U.S.A.

GET YOUR SCRAP INTO THE SCRAP!

THIS FREE BOOKLET contains reproductions of the Disston Conservation Control Cards, a convenient order blank and a description of the Disston Plan. Send for it *now!*

MERCER
"THE NAME THAT CARRIES WEIGHT"
MATERIAL HANDLING EQUIPMENT
TRAILER TRUCKS
LIFT TRUCKS
CONVEYORS
ELEVATORS
CRANES
Mercer units are planned to heavy handling jobs! So whatever your problem—don't let it weigh you down . . . Call Mercer for a lift!
MERCER ENGINEERING WORKS, INC.
Works: CLIFTON (ALLWOOD), N. J.
Sales Office:
30 CHURCH STREET, NEW YORK
Export Office: 80 Broad St., New York

plication of an order should be used to afford employees protection against losses of earnings and jobs.

4. Savings remaining after such provision has been made for employees should be passed on to consumers in the form of lower prices.

5. Such plans should be limited to the duration of the emergency.

6. The chairman shall designate alternates for the representative of the committee or for the representative of the union and decide in the event of the commission's inability to reach an unanimous decision.

**WLB Rewrites Contracts*

Any provisions of a contract that prevent the adoption of conservation plans as announced by ODT will be set aside by direction of WLB.

This is a further step in the direction of subordinating private and industry conveniences to the exigencies of war.

WLB has also ordered a provision for blanket wage increase to be deleted from a contract, since it was not consistent with the President's stabilization program.

A further illustration of WLB's writing contracts for the parties is its ruling that a union cannot agree that it will not engage in union activity on company property. Since such a clause, though agreed upon by the union, is not realistic or conducive to industrial harmony, the provision is changed to ban union activity on company time only. (General Chemical Company.)

**Employer Ordered to Sign Contract*

The War Labor Board required employers, as a condition of continued membership in their association, to sign a contract with a union or sever their connection with the association. (Western Pennsylvania Motor Carriers Assn.)

**WLB Grants Equality of Wages*

Where differences exist in production and quality of performance between men and women engaged in the same occupation, a wage differential may be paid. Where, however, the jobs are subdivided and reassigned between the sexes and no additional labor costs result, the WLB holds that no differential is justified. (Browne and Sharpe Mfg. Co.; General Motors Corp.)

Other factors to be considered in granting equality of wages are:

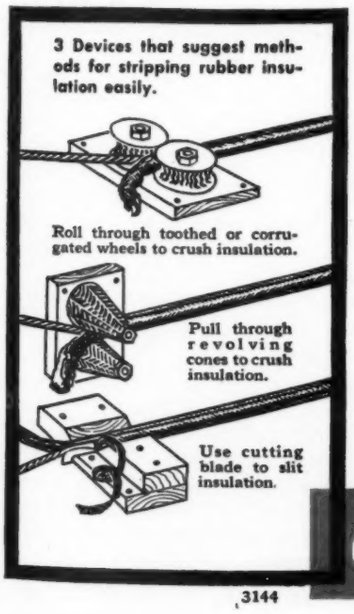
1. Slight changes in the job may not be used as reason for setting up wage differentials against women.

2. Determination of work equality may not be made solely on the basis of physical characteristics of operation.

3. Adjustment of wages is com-

PRODUCTION
and
PROTECTION
M H
VALVES, HYDRANTS
and
Pipe Line Accessories
M & H products have been used in industrial plants for many years for conveyance of water, gas, steam, oils, acids and chemicals.
M & H Gate Valves are cast iron body, bronze mounted, with double-disc parallel seat, or Solid Wedge type. Non-Rising stem or screw and yoke. They come either with flanged or screwed connections. Valves in fire protection line are marked "UA-FM" to denote approval of both the Underwriters and the Factory Mutuals.
M & H Valves are used in industrial plants for water, gas, steam, oil, chemicals and are furnished in all commercial sizes from 2" to 30", inclusive. They are cast iron body, bronze mounted, furnished double disc parallel seat or solid wedge. They are heavily proportioned and have a high factor of safety.
OTHER M & H PRODUCTS
Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
Tapping Sleeves
Check Valves
Floor Stands
Extension Stems
Mud Valves
Flap Valves
Sludge Shoes
Write for Catalog 34
M&H VALVE
AND FITTINGS COMPANY
ANNISTON, ALABAMA

that Rubber Scrap is Priceless!


3 Devices that suggest methods for stripping rubber insulation easily.
Roll through toothed or corrugated wheels to crush insulation.
Pull through revolving cones to crush insulation.
Use cutting blade to slit insulation.

3144

The rubber insulation of wire and cable is even more valuable today than the copper conductor, scarce as copper is! Saving vital copper is absolutely necessary, of course, but the rubber in wire and cable insulation is priceless. The rubber shortage is so acute that immediate corrective measures in both military and civilian life have become necessary. So get into the scrap and salvage both copper *and* rubber.

Okonite cords, cables and insulations have extra years of service built into them. Get these extra years of service by using every precaution for their protection and longevity.* But, if they can no longer be used, *strip* off the rubber insulation and sell it to a licensed rubber dealer and sell the copper conductor to a metal dealer.

The scrap you save here and now may later become the difference between victory and defeat on some far-flung battlefield.

*If you have not already received a copy of the booklet "Do's, Don'ts and How's For Longer Life of Your Insulated Wires and Cables" write for a copy today.

THE OKONITE COMPANY

Passaic, New Jersey Offices in Principal Cities

OKONITE Insulated Wires & Cables

Salvage Your Scrap – Buy U. S. War Bonds

Save CRITICAL WAR MATERIALS

Use PERMAFLECTOR Floodlights

Wherever you want LIGHT for production or protection, install PERMAFLECTORS – the Silvered-Glass Reflectors that pick up the Maximum Flux of Light and put it where you need it. New, Permaflector-equipped enclosed floodlights employ a minimum of critical war materials. Rugged, water-tight, weather and corrosion-resistant. Complete. Ready to set up. Available in four wattages and three light distributions – broad, intermediate, concentrated.

FOR INDUSTRIAL LIGHTING . . . .

For broad illumination or for high intensity illumination, properly-spaced, low wattage Permaflectors may be the answer to your lighting problem. Ready for service, require no metal housing, quickly, inexpensively surface-mounted or suspended. Minimum maintenance–the silvered-glass reflecting surface of Permaflectors will not darken, tarnish, or discolor, nor will the backing check or peel.

FOR AUXILIARY LIGHTING . . . .

To pick up the weak spots in your lighting, to provide extra light for quick, accurate, effortless seeing, install Permaflector auxiliaries. Over 70 designs– a correct shape for almost any and every purpose – to make light a more efficient production tool.

PITTSBURGH REFLECTOR CO.

Pittsburgh Permaflector

407 OLIVER BLDG. • PITTSBURGH, PA.

Tear Off

Clip to letterhead. Sign. Mail for complete information, prices.

patible with equal work where lower performance standards must be established for women.

4. The equality principle must be worked out, not in a single contract clause but in individual situations by parties who cooperate in good faith to secure the desired objective.

5. Where there is an honest difference of opinion concerning quality, quantity, or comparability, the dispute should be settled either through established grievance procedure or through arbitration.

**WLB Denies Wage Increase*

Where a wage increase was offered to attract employees, WLB ruled against it even though management and the union insisted that such increase was necessary to conserve personnel.

Even though inequalities were shown to have existed, an increase though voluntarily negotiated was rejected by WLB since the employees had already received wage increases in excess of the 15 percent cost of living formula applied by the Board. (J. H. Williams & Company.)

**Sympathetic Strike Barred*

WLB ordered a teamsters' union to strike out from their collective bargaining contract a sympathetic strike clause of long standing. In its place was written a clause barring work stoppages unless authorized by the international union. (Western Pennsylvania Motor Carriers Assn.)

**WLB Grants Increase*

In affirming its intention of retaining Little Steel formula WLB granted:

1. Four cents an hour increase to employees of Underwood Elliott Fisher Company retroactive to May 26 (union asked 10-cent increase) and standard maintenance of membership clause.

2. Approved wage increase previously agreed upon by RCA Camden plant and United Electrical, Radio and Machine Workers of 5½ cents an hour although only a 4-cent increase was needed to bring wages up to Little Steel formula level. The 1½-cent additional increase was granted to "correct inequalities" between that company's wages and others in same area.

3. Rejected panel recommendation for 5 cents an hour increase (union asked 12½ cents) to 600 Worcester Steel Pressed Company employees because a 4-cent increase was sufficient to bring wages to the Board's stabilization level in conformity with the Little Steel formula.

4. Directed E. H. Sheldon Company to grant employees 3½ cents an

DAYTONS STAND GUARD

OVER 100,000 OF AMERICA'S INDUSTRIAL FRONTS

On more than 100,000 vital industrial fronts Dayton V-Belts vigilantly guard the output of every conceivable type of machinery essential to America's global war. And on this nation-wide production front, Daytons are pledged and proved to save precious time and protect machinery which is invaluable to our war effort.

Cool running, long life Dayton V-Belts have the strength, flexibility and gripping power to assure closer speed control—cut power losses and reduce maintenance and adjustments to a negligible minimum.

Furthermore, built-to-bend Daytons operate on short centers and permit the efficient operation of more high-speed machinery per square foot of floor space.

Located nearby to serve your wartime needs is a Dayton Distributor whose stock of V-Belts is supplemented by strategically located factory warehouses. So, for service or for helpful suggestions regarding the conservation of V-Belts through proper application and maintenance, call your nearest Dayton Distributor.

THE DAYTON RUBBER MFG. CO.
World's Largest Manufacturer of V-Belts
DAYTON, OHIO

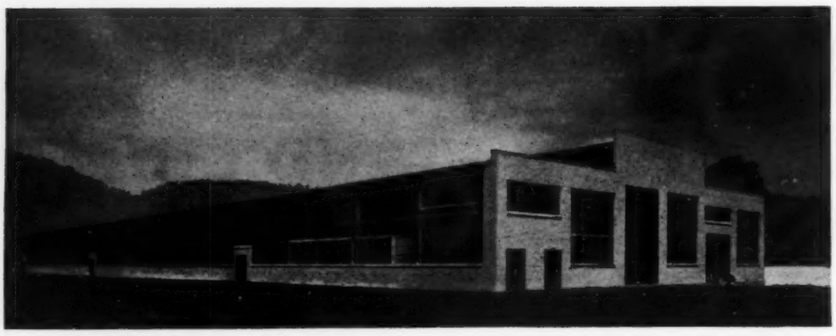
DAYTON RUBBER EXPORT CORPORATION
38 Pearl Street New York, N. Y. U. S. A.

THROW YOUR SCRAP INTO THE FIGHT!

Dayton V Belts
LIFELINES OF POWER VITAL TO VICTORY

THE GREATEST NAME IN V-BELTS

Copyright, 1942, The Dayton Rubber Manufacturing Co.



ANOTHER NEW UNIT IN AMERICA'S WAR PRODUCTION STRENGTH

by PITTSBURGH •DES MOINES

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

These construction views of an Eastern plant, built for volume production of certain war materials, show a typically Pittsburgh-Des Moines job of design, fabrication and erection—meeting exacting requirements with speed and craftsmanship—under a single contract, with one responsible guarantee. ● An unusual feature of this project: three large office-locker-restroom units built in the monitor, permitting unobstructed use of main floor for production.

PITTSBURGH-DES MOINES STEEL CO.

PITTSBURGH, PA. 3458 NEVILLE ISLAND—DES MOINES, IA. 959 TUTTLE ST.

NEW YORK, ROOM 944, 270 BROADWAY . . . CHICAGO, 1262 FIRST NATIONAL BANK BUILDING
DALLAS, 1263 PRAETORIAN BUILDING . . . SAN FRANCISCO, 665 RIALTO BUILDING
SEATTLE, 1166 EIGHTH AVE., SOUTH

hour increase retroactive to May 1 (union asked 14 cents).

5. Ordered increases ranging from 1.9 to 5.2 cents an hour for U. S. Cartridge Company employees to bring average hourly earnings up to those of 19 comparable plants in area (St. Louis). The grant was based on the "equality" issue, since the plant was not in operation in January 1941, and not under Little Steel formula.

NATIONAL LABOR RELATIONS BOARD

**Wagner Act Applied to National Bank*

The Wagner Act has been held to apply to a national bank which had its main office and 493 branches in California, but did a nation-wide banking business. Since the bank's operations involve the constant use of channels of interstate and foreign communications, concluded the court, its activities amount to interstate commerce. (NLRB vs. Bank of America National Trust and Savings Association.)

**Reinstatement Ordered*

Economic strikers were held entitled to reinstatement in preference to new or former employees when the Board could give no credence to the claim that these strikers were passed over for others who had superior efficiency, or to the management's desire to train new workers. (Cleveland Worsted Mills Company.)

**Back Pay Ordered*

The mere fact that discharged employees failed to seek out other employment does not deprive them of their right to back pay since there may be a valid excuse for such failure. Great distance of other employment from home, as well as inexperience in other work, may be plausible reasons. (Cleveland Worsted Mills Company.)

In computing back pay, once it is determined to be owing to an employee, the Circuit Court of Appeals ruled that it must be cumulated for the entire period, even though during some portions of the period operations were curtailed. The employer could not deduct the amounts earned elsewhere by these employees during the period when the employer would not normally have employed them. (NLRB vs. Reed & Prince Manufacturing Company.)

**Interference Barred*

Since the employer is under the duty not to interfere with employee's right to collective bargaining, he cannot accept employees' offer to withdraw on

You Double Your Installation Crew

Without Adding a Man

When You Specify Combination Starters

USERS REPORT INSTALLATION TIME CUT 50%

A survey of users shows that they mount G-E combination starters in 50 per cent less time, and wire them in 40 per cent less time.

Here's why . . .

1. You can avoid one complete mounting job on each installation—combination starters combine both a motor switch and a magnetic starter in one unit.

2. Combination starters come to you already wired—only wiring necessary is the connection of power and motor leads.

Don't waste time installing two devices where one can do the job. Call your local office and find out all about these starters. General Electric, Schenectady, N. Y.

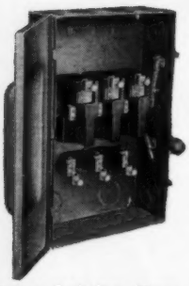
Regularly furnished for use with motors up to 200 hp.

The Navy "E", for Excellence, has been awarded to 72,780 General Electric employees in six plants manufacturing naval equipment.

GENERAL ELECTRIC

TO DO THE JOB BETTER...

MORE AND MORE MANUFACTURERS

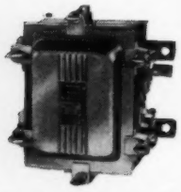


USE *Federal* SWITCHES

ON JOBS LIKE THIS*

Safety Switches Type "A", "C" & "D" 30 to 1200 amperes Single and Double Throw

Today only one thing is important—Victory. There's no time left to lose—just time to WIN. That's why the men who know . . . the men turning out the planes, guns, ships and tanks are switching to Federal. The story's the same all over the country . . . wherever the pressure's on . . . wherever plants are going full blast twenty-four hours a day, seven days a week . . . wherever the job must be done better and faster . . . Federal Safety Switches are at work.



Weatherproof — Dust-tight Switches 30 to 1200 amperes

These "producers for Victory" find many advantages in Federal safety switches—trouble-free operation on essential circuits—ribbed arcing chutes—patented "griptite" fuse clamps—and many other exclusive Federal features. You will, too! — when you switch to Federal to get the job done better and faster.

Complete line of circuit breakers and fusible panelboards

*This photograph was taken in the plant of a large manufacturer of airplane parts. For obvious reasons the name of the manufacturer cannot be divulged.

FEDERAL ELECTRIC PRODUCTS COMPANY

58 PARIS STREET, NEWARK, N. J.

PANELBOARDS • SWITCHBOARDS • SAFETY SWITCHES • CIRCUIT BREAKERS

condition that their pay be increased. (Medo Photo Supply Corporation.)

**State Court Yields to NLRB*

A state court has no jurisdiction over suit by a discharged employee seeking to invalidate a contract which contained a clause negotiated under the National Defense Mediation Board. The clause, which the employee sought to invalidate, provides that if any employee engaged in activity in the plant calculated to undermine the status of the union duly elected as the bargaining agency, the employer will take appropriate disciplinary action. Since the controversy is a labor dispute within the meaning of the Wagner Act, ruled the New Jersey Court, the state court is without jurisdiction. The matter is the exclusive concern of the NLRB, from which an appeal may be taken to the Federal Circuit Court of Appeals. (Keller vs. American Cyanamid Company.)

Publicizing Penalty

Employer was ordered to post notice to his employees that he has been held in contempt of court. (Remington Rand Company, Inc.)

Management Shorts

(Continued from page 112)

weaving sideways. Then, when the car is subjected to shock, it is simply knocked out from under the load, and it, rather than the equipment, absorbs most of the shock.

In preparing the car, sufficient room is left at each end so that the load will have ample room to shift. A "cigarette" made of excelsior rolled into burlap, 18 to 20 inches in diameter, is placed at each end of the car to serve as a bumper. Where the load is short and placed in the center of the car, the bumpers are moved up to within about three feet of the load, and car blocks are placed behind the bumpers to hold them in place. Side braces, 2x4 or 3x6 inches thick, depending on the size of the load, are extended from one end of the load to the other and nailed to the floor to prevent the load from weaving sideways. This keeps the car in balance. Where more than one unit is loaded in the car, the units are bound together by heavy-gage band iron or heavy-gage wire to prevent one unit from sliding a greater distance than another.

In loading pieces under 30,000 pounds, it has been found that spikes driven into the floor just ahead of the load at both ends of the car and projecting 2 or 3 inches above the floor provide an excellent retarder, decreasing the speed at which the load can move forward or backward into the bumpers.

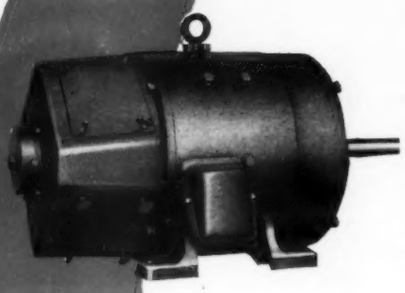
Steel mill control panels ranging from

CENTURY MOTORS
are Famous for Their Ability to "Keep a-running"

They are serving the Armed Forces of the United Nations with a distinction that is important to you.

Standing the Shock of Battle

In the Naval Service, in typical applications, modern Century Motors aboard ship must stand up under the shocks of gun-fire and bombing attacks. They are especially built to take the punishment of actual combat.



7½ HP Direct Current Ball Bearing, Fabricated Steel, Water Proof Navy Motor

And the Demands of War Production

Similarly, on the production front, Century Motors are staying on the job under 24-hour, continuous, 3-shift production. They take the shock loads of the heaviest machinery, yet their unusual freedom from vibration helps speed up the finest precision machine tool production.

For the Future

Because of War demands, Century is now engaged in the production of a wider range of motors, generators, and other rotating electrical apparatus than ever before. As a result, when Victory has been won, we'll meet your requirements with an extended, improved, and more complete line than we have offered since our founding in 1903.

Because of what Century is doing today — we'll serve even better tomorrow.

3 HP Direct Current Ball Bearing, All Steel Navy Motor

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis, Missouri
Office and Stock Points in Principal Cities

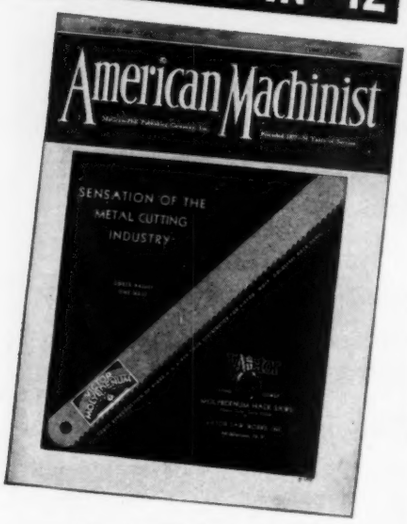
Century MOTORS

301

Century Motors, both alternating and direct current, are being produced for the operation of the many kinds of machine tools, industrial fabricating and processing machinery used in the manufacture of ammunition, munitions, cargo and combat ships, and for driving their operating equipment.

One of the Largest EXCLUSIVE Motor and Generator Manufacturers in the World.

SENSATION IN '32
SALVATION IN '42



Victor Saw Works, Inc. advertisement on front cover of "American Machinist" for February 4, 1932.

Ten years ago, the first molybdenum alloy hack saw blade—introduced by VICTOR—was the sensation of the metal cutting industry, bringing tungsten high speed steel performance at half the cost.

Today, the molybdenum alloy blade is the salvation of the metal cutting industry, for today's VICTOR "Moly"* High Speed—ahead in steel analysis and heat treatment—is maintaining and accelerating production schedules for those accustomed to the use of other high speed steel blades.

Whenever you buy molybdenum alloy blades, be sure you get the original, genuine VICTOR "Moly"* High Speed, easy to identify by its all-over gold metallic finish.

To speed work and save blades give your men this fact-packed 20-page booklet on selection, use and care of hack saw blades and frames. Get it free from your supplier or write direct.

VICTOR SAW WORKS, INC.
MIDDLETOWN, NEW YORK

Victor
VICTOR HACK SAWS Wins on Merit

3184

*T.M. Reg.—Blades bearing the name "Moly" are made only by Victor Saw Works, Inc., and affiliated companies.

10 to 40 feet in length, consisting of several sections each approximately 3 feet wide and of various heights, were formerly knocked down for shipment, and each section was placed in a separate box. In wiring the panels, where wires crossed from one section to another, it was necessary to cut the wires and use a connection strip. Several strips were used on each panel. Under the new method cutting wires and use of connection strips are eliminated, and the panel is shipped complete. When panels are thus loaded it is not necessary to use sides, ends, or top for crating or boxing. Skids, crosspieces, and tie rods hold the panel in place and keep it from weaving.

•

Load charts at a Pratt & Whitney Aircraft plant record use of 6000 machines, minimize idle time, avoid overloading, and serve as a guide in the purchase of new equipment.

•

Easier to Drill on Slanted Drilling Table

SOURCE—Vega Aircraft Corporation, Burbank, Calif.

A slanted drilling table is one of our recent innovations designed to add to employees' ease and efficiency. Under the old method, with the flat table, the employee found it necessary to assume an uncomfortable position when drilling at

Girls find drilling much less tiring when the table top is slanted. They can stand in a normal position, instead of the uncomfortable one necessary when the work was placed on a flat top

Man Power Saved

For LIQUID CARBONIC CORP.

WITH LONGER-LASTING

CAR-NA-VAR
TRADE MARK REG. U.S. PAT. OFF.

FLOOR TREATMENTS

"Only four applications annually," reports Chicago's famous Liquid Carbonic Corp., "give our floors a bright, non-slippery finish. Car-Na-Var treatments outwear ordinary waxes." Fewer applications annually mean valuable manpower saved for other important jobs.

While Car-Na-Var floor treatments cost a little more per gallon than most ordinary waxes, in the long run they not only save labor, but actually cut over-all material costs as well. Want proof? Ask for demonstration on your own floors.

FREE BOOK

A handy reference book for the maintenance man, giving the step-by-step treatment of every type of floor. Write for a copy today . . . no obligation.

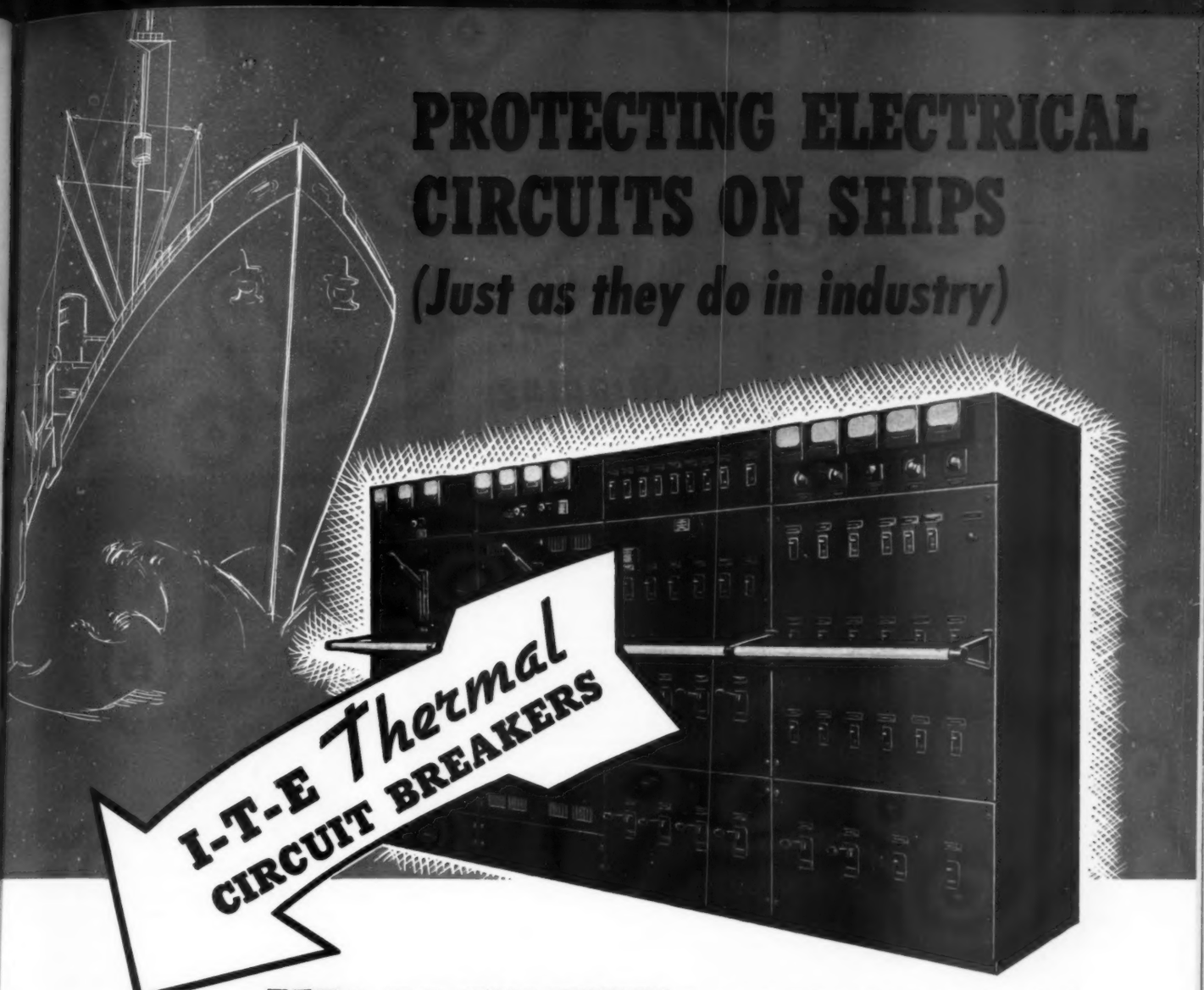
CONTINENTAL CAR-NA-VAR CORP.
1400 E. National Ave. **Brazil, Ind.**

World's Largest Manufacturers Specializing In Heavy Duty Floor Treatments

CAR-NA-VAR CAR-NA-LAC CAR-NA-SEAL

PROTECTING ELECTRICAL CIRCUITS ON SHIPS

(Just as they do in industry)



I-T-E *Thermal* CIRCUIT BREAKERS

There are sixty-three thermal circuit breakers in the marine switchboard illustrated above. They are of three types: twelve 600-ampere frame (right, below); eight 225-ampere frame (left, below); forty-three 100-ampere frame (right).

DO NOT THINK that in building ships at unheard-of speed, American designers and naval architects have lowered their standards for electrical protection. Not in the slightest.

The I-T-E switchboard shown above and the circuit breakers in it are built as exactingly as any equivalent protective apparatus ever made under peacetime conditions.

Thermal circuit breakers are emphasized here particularly because they contain many parts in extremely compact arrangements. The assembly of these breakers is no child's play. Yet with production moving at top speed every I-T-E thermal circuit breaker that goes into service has passed all tests—and they are TESTS.

Whether the intended service for protective equipment is aboard ship or ashore, there can be no compromise with long-established standards of design and workmanship.

Representatives in Principal Cities

I-T-E

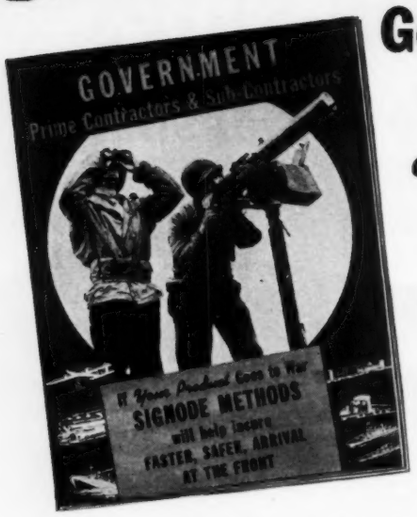
AIR SWITCHGEAR

IMMERSED IN AIR — ENCASED IN STEEL

The Army-Navy "E" for Production Excellence

CIRCUIT BREAKER CO., PHILADELPHIA, PA.

SIGNODE SYSTEM OF STEEL STRAPPING



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Write for it Today

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Shows Methods and Tools Widely Used for Safe, Fast Shipment of Vital Ordnance Materials, Ammunition, etc.

This new bulletin shows how government prime contractors and sub-contractors are using scientific Signode loading methods to assure "on time" delivery of shells, truck bodies, airplanes, inert bombs, life rafts and other vital war products. Also illustrates the Signode Tools used for safe application of Signode Steel Strapping. *Send for it today.*

SIGNODE STEEL STRAPPING CO.
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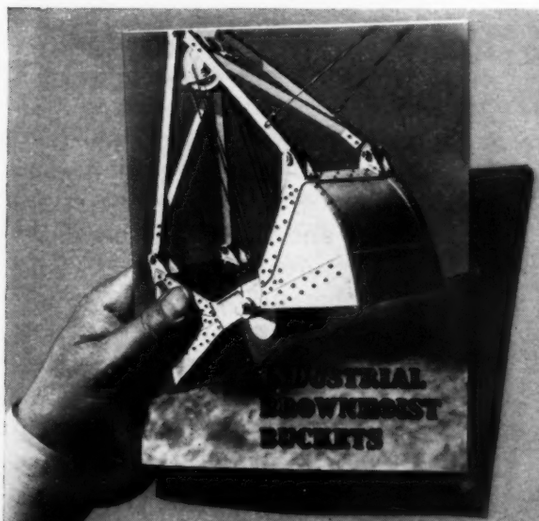
Representatives in Principal Cities Throughout the United States and Canada

SIGNODE

25 Years of Packing Improvement



WRITE TODAY FOR THIS 24 PAGE BUCKET CATALOG

Just off the press is this two-color, twenty-four-page catalog packed with the facts you'll want to know about buckets. Which bucket is best suited to the job and what each type (rope-reeve, power-wheel, special-purpose, open-type grab and link-type) will do is clearly explained by word, chart and photograph. If you haven't received your copy, write for it today.

THROW YOUR SCRAP INTO THE FIGHT!

INDUSTRIAL BROWNHOIST

BAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

the work bench. Now he can stand in an upright position and so is able to work better and longer without tiring.

•

Welding Short Cuts Speed Up Welding

SOURCE—Lockheed Aircraft Corp., Burbank, Calif.

Welders at work on heat-treated tubing for bombers find it easier to handle small parts when they are clamped to a turn-

Small parts are clamped to a turntable which the welders rotate with their feet — much easier to handle

table which the welders rotate with their feet. To the welder's right in the illustration is an automatic torch lighter enabling the operator to turn off the torch without touching regulating valves of handle. When the torch is picked up, a small flame relights it. Gages on common gas lines are in back of the welder. On the main line is a set of water traps designed to prevent fire in case of a gas backfire.

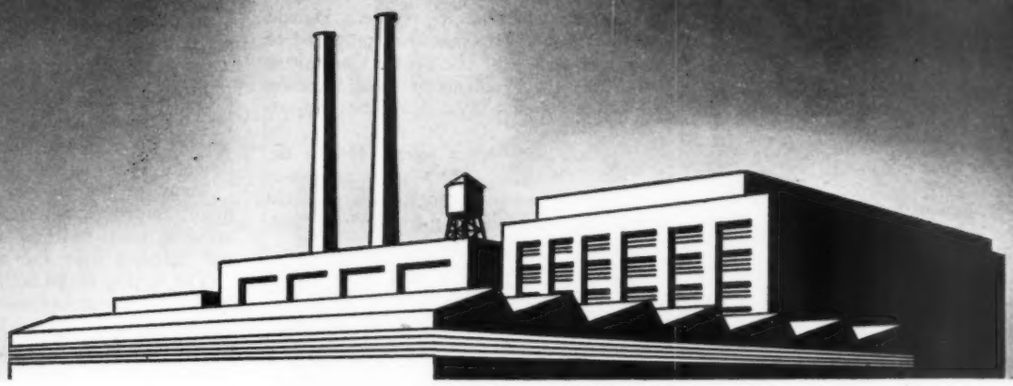
•

Microfilming Records Saves Storage Space

A story of the electrical industry's growth since the early 1880's is being transferred from two million sheets of old Irish linen and drawing paper to movie film at the Westinghouse East Pittsburgh works by microfilming equipment. An acre of storage space will be cleared for productive use and a more efficient record system set up by reducing the size of tons of permanent records. When recorded on film, documents that now occupy more than an acre in floor space can be stored in a vault about ten feet square.

More than two million documents will be photographed. To be put on 16- or 35-mm. movie film, depending on size, are records ranging from 5-in. cards to 5-ft. drawings. Records of typing paper size or

your plant distribution system



CHOOSE THE SYSTEM THAT "FITS" THE PLANT

Building tanks . . . planes . . . ships . . . guns?

Is it a small plant . . . a large one?

What are your service requirements?

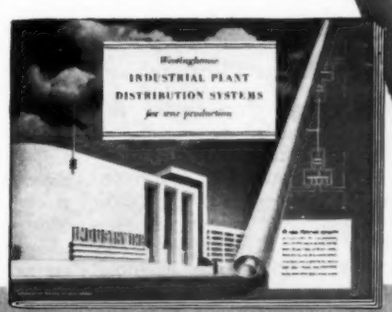
It makes no difference what size, shape, or type of plant it is. From the available distribution systems for which Westinghouse builds apparatus, you will find one that will serve efficiently and economically.

There is no universal distribution system that can serve all types of industries. The important job is to select the system that "fits" the plant.

Westinghouse can supply equipment for all types of power distribution systems, including the new Plant Network System now installed in approximately 40 large war factories.

All systems recommended by Westinghouse are designed for use with standard distribution equipment. There will be no time lost in building special apparatus.

Write today for the Westinghouse book B-3152, which briefly describes a group of different plant distribution systems. It points out the advantages of each system and will save time in helping you determine the best one for your plant. Or, if yours is a rush job, call our local office and ask one of our engineers to call and discuss your problem. You'll get immediate co-operation. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.



FREE QUICK FACTS ABOUT PLANT DISTRIBUTION SYSTEMS

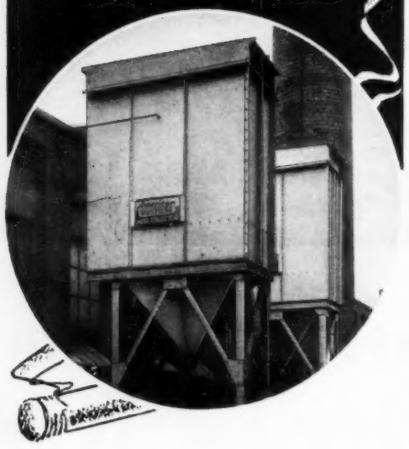
Westinghouse Elec. & Mfg. Co.,
East Pittsburgh, Pa.
Please send book B-3152 giving quick facts on Westinghouse Distribution Systems.

Name _____ Title _____
Company _____
Address _____ State _____
City _____

PLANT DISTRIBUTION SYSTEMS

TRAPPED!

DUST PARTICLES SO SMALL *that* 300 BILLION WEIGH LESS *than* YOUR FAVORITE CIGARETTE



HARMFUL dust particles range between 0 and 20 microns in size. Just how small is that? According to eminent authorities it takes in the neighborhood of 300 billion of these particles to weigh one gram, or roughly the weight of a cigarette!

To control particles as infinitely small as these requires a dust collector of exceptionally high efficiency. But, small as they are, such particles cannot escape the arresting action of "Dustube" cloth bag type dust collectors.

Results in hundreds of applications prove that "Dustubes" meet the most exacting requirements. *Efficiency by weight:* 98% and more; *efficiency by dust count:* discharged air shows less than ten million particles per cubic foot from 2 to 10 microns in size, (as determined by the impinger method).

Write for new Dustube Catalog No. 62.

AMERICAN FOUNDRY EQUIPMENT CO.
374 S. Byrkit St. Mishawaka, Ind.

DUSTUBE
DUST COLLECTORS

THEY SAY AND DO

War Liabilities Board Proposed by Nelson

Conscious of a coming problem, Donald M. Nelson, WPB Chairman, proposed to a recent session of the Senate Committee to Study the Problems of Small Business the creation of a War Liabilities Adjustment Board.

"Before the war is over," Nelson declared, "we shall need to use in some way for essential purposes all the management ability we have, all the manpower we have, and all the materials we have."

For this reason, Nelson declared, he was opposed to any governmental action which might immobilize "or freeze into a non-productive state" any property or facility that might prove essentially productive. Nelson therefore offered his War Liabilities Board plan, urging the Senate group to give study to any action designed:

1. To help small business enterprises adversely affected by the war to take care in an orderly fashion of overhanging liabilities which, under ordinary conditions, they would have been able to discharge.

2. To provide effective mechanisms for financing small business after the war.

3. To provide effective means for giving small business technical and other assistance at the end of the war.

4. To provide a mechanism for giving to small business enterprises broken up by the war a priority in the acquisition of machinery and equipment when the war is over.

With such protection assured, Nelson said, it would be possible for many small businesses to turn their machines and personnel over to the government or allow the usable part of them to be moved into larger operation if it is found that the entire enterprise cannot be adapted to war work.

"If we can take the work to the machine," Nelson said, "I think we should make every effort to take the work to the machine first. If that can't be done, of course, this is a war effort and we must take the machines.

"The one thing we must not do is to pack away permanently, in grease or in any other way, machinery and equipment against the end of the war."

Smaller War Plants Corporation

Smaller War Plants Corporation officials meanwhile proceeded with plans for opening branches in the principal regional offices of the War Production Board to facilitate contact between small manufacturers and procurement officers of the armed services. Lou E. Holland, head of the Corporation, continued to assemble personnel for his dual task of financing small companies and helping them to obtain war contracts. The finance job is carried on by the Corporation itself and the work-spreading job by the Smaller War Plants Division of WPB, also headed by Holland, which supplants the recently disbanded Contract Distribution Branch.

Here's the way to get a Smaller War Plants Loan:

"If you are a manufacturer and you can show that a loan will kill a German or a Jap," a spokesman said, "write to the Smaller War Plants Corporation, Hotel Raleigh, Washington, D. C."

Many of the normal restrictions that might impede a government loan are relaxed in favor of those seeking loans for war purposes from this agency.

The letting of $6,000,000 in Chemical Warfare Service contracts to groups of small machine shops in Providence, R. I., and Louisville, Ky., was announced simultaneously by the Smaller War Plants Division of WPB.

Concentration of Industry

Another important phase of the small business problem is that of the concentration of industry, along lines already extensively tested in England. "Concentration" means, in general, the selection of one or a few plant units to carry on the production of civilian goods within an industry while the remaining plants convert wholly to war work.

To date three significant experiments in concentration have taken place in this country, in the typewriter, stove, and bicycle industries. In the strictest sense, the typewriter example is not a case of "concentration" as such, but rather one of the policy that may be adopted when all civilian production is ordered stopped by the government. All the typewriter manufacturers will convert to war work and only one, the Woodstock Company, will be allowed to go on making typewriters. But these machines will be for government use only. Woodstock will make 22,000 machines in the next two years.

In the bicycle industry two companies, the Huffman Manufacturing Company of Dayton, Ohio, and the Westfield Manufacturing Company of Westfield, Mass., are continuing the manufacture of bicycles. The wheels are of a highly simplified design and only 10,000 a month (6 percent of normal national output) will be made —6000 by Westfield and 4000 by Huffman.

The component companies of the stove industry have been grouped into three categories: A, those who did a gross business of $2,000,000 or more in 1941; B, those who did less than $2,000,000 and are located in labor shortage areas; and C, those who did less than $2,000,000 and are currently not in labor shortage areas. Class A and B plants are required to do war work. Only the Class C companies are being allowed to make stoves for civilian use and these are of a strictly simplified design.

What is the pattern of policy on concentration? This has not crystallized as yet

but certain tendencies are apparent. It is plain, for example, that concentration will be attempted only in the case of industries manufacturing essential civilian products, that the amount of production will be an absolute minimum, and that this production will be achieved by the most efficient means consistent with the major considerations of the war economy; manpower, materials, and transportation. These last three factors weigh heavily in the selection of plants for concentrated production. A fourth important element is their nonsuitability for conversion to war work.

What about brand names and trademarks? It is expected that the tendency will be to keep brands alive. This was done in the stove industry. But it is probably too soon to tell definitely. The standard bicycles carry only an H (for Huffman) or a W (Westfield) after the serial number.

•

Holds Government Pays New Wage Boosts

Uncle Sam himself will pay 75 percent of most of the new wage increases granted by industry, with production at capacity and prices controlled. That is the opinion of Oliver F. Wadsworth, author of a recent article in *The Exchange*, magazine of the New York Stock Exchange.

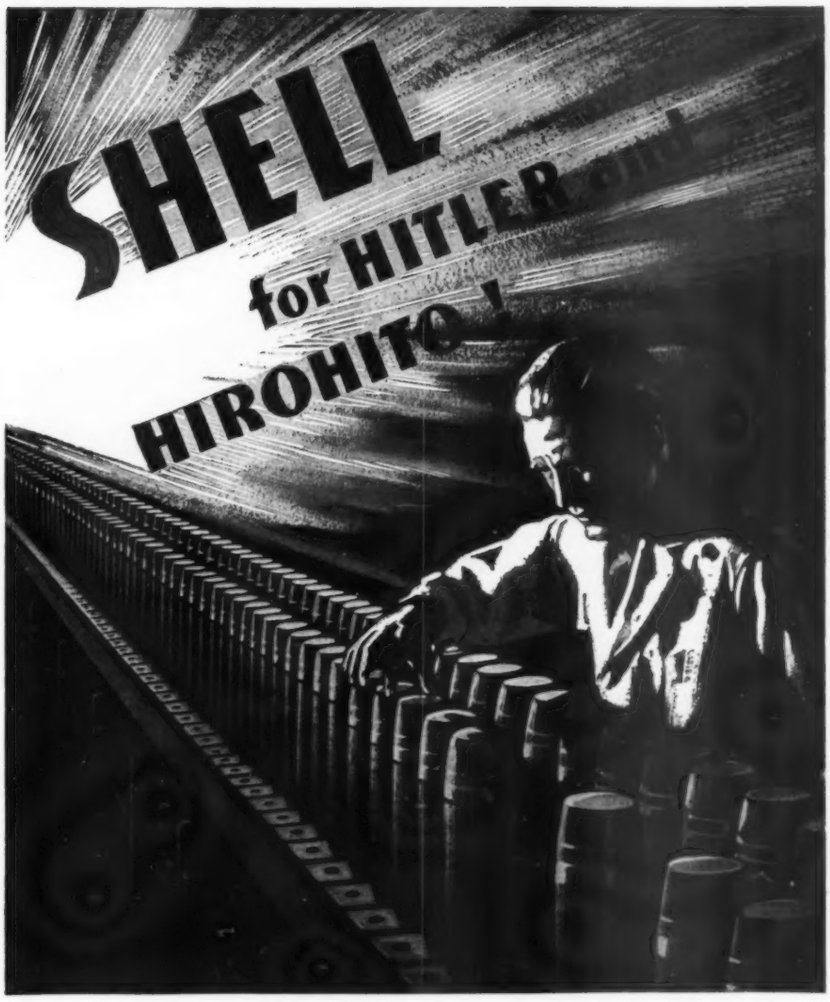
Wadsworth points out that net earnings of the steel industry in the last quarter of 1941 were 11.4 percent of gross revenues while wages were 37.7 percent. He then takes the recent 5 percent pay increase granted to "Little Steel" workers by the War Labor Board as his text, and applies these figures to a hypothetical steel company with a net income of $10,000,000 before taxes.

On such a company, he says, total revenues would be $88,000,000 annually, and a 5 percent wage increase would add up to $1,660,000. Assuming that the House tax bill is in effect, that because of capacity levels volume will not increase and that fixed selling prices will permit no increase in dollar volume, he estimates that the 5 percent wage increase would cost the government $1,494,000 in taxes, or 90 percent of the amount of the wage increase.

With the new taxes at the old wage scale, the company would pay $7,999,200 in taxes. With the new taxes at the new wage scale, the tax bill would be $6,505,200. The government would lose $1,494,000 in taxes and the company's net income after taxes would drop only $166,000.

Some of the money lost in corporation taxes, Wadsworth admits, would return to the government in individual income taxes. His figures show that, if all employees were single, the loss to the government would still be $1,188,000 or 71 percent of the wage increase; if all were married, $1,274,000 or 76 percent; and if all were married with two dependents, $1,174,000.

"It becomes obvious," Wadsworth



Shell pouring off the production lines in scores of America's munitions plants gives the right answer to Axis "global grabbing."

And Standard Conveyors help to keep shell moving — swiftly and smoothly — through successive steps in production and on their way to the battle fronts.

Designed specifically for the handling of shell, these conveyors were developed by Standard engineers in response to an immediate need of American munitions makers. Just as they have always designed conveyors for new and better ways of handling peacetime products, Standard engineers met the emergency without hesitation, drawing upon their long experience — their thorough familiarity with industrial handling needs.

If you are producing war material or other products considered necessary to the war effort, find out what Standard Conveyors can do to step up production in your plant. Write for full information and copy of "Conveyors by Standard"—a valuable handbook on conveying methods.

STANDARD CONVEYOR COMPANY
***General Offices:* North St. Paul, Minn.**
Dept. FM-11

★ ENGINEERED FOR FASTER PRODUCTION ★

FIRST AID for WARTIME BEARINGS

Careful use of bearing metals helps the war effort two ways . . . much needed metal is saved . . . and machines stay on the job longer.

- **LINE OLD BRONZE BUSHINGS WITH BABBITT**
- **USE MAGNOLIA'S SUBSTITUTES FOR TIN-BASE BABBITTS**
- **USE THE PROPER METAL FOR EACH BEARING**

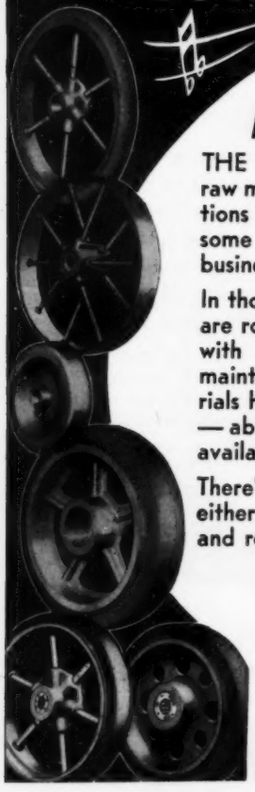
Free Bulletin Shows How To Make Better Bearings

Shows what metal to use where. Write for this valuable data book.

MAGNOLIA METAL CO.
18 West Jersey Street, Elizabeth, N. J.

MAGNOLIA BEARING METALS

Merrily They Roll Along!



Keep Em Rolling!

THE free movement of finished products and raw materials is one of the most important operations in any business. The easier and less troublesome the movement—the more efficient is the business.

In thousands of plants, EWC Steel Tired Wheels are rolling along merrily—saving time and effort with every turn. EWC Wheels reduce floor maintenance and repair costs—speed up materials handling with complete safety—save power—abolish noise. (EWC Rubber-Tired Wheels available on direct War Orders.)

There's an EWC Wheel for almost every need—either to fit old axles or furnished with new axles and roller bearings.

WRITE FOR LITERATURE, Prices and Suggestions.

EWC WHEELS
ELECTRIC WHEEL CO.
Dept. FA QUINCY, ILL.

concludes, "that the taxes contemplated by the House throw too large a share of the burden on the corporation. Further increases in costs, of which labor is the most important, cannot be carried and must therefore be taken out of taxes. A better tax balance must be achieved through higher rates on individuals in the lower brackets. Wage increases in combination with present tax policies will vastly complicate the financing of the war."

•

Welding Awards Promise War Production Savings

The possibility of tremendous savings in the production of war equipment—both in dollar costs and in critical man-hours—is indicated in the announcement on October 6 of awards in the 2½-year study sponsored by The James F. Lincoln Welding Foundation of Cleveland. A total of 408 awards were made to 458 participants in every conceivable division of manufacturing industry.

"Savings in critical materials and in production costs," said Dr. E. E. Dreese, chairman of the Foundation and of its award jury, "reported available by arc welding in the award studies, assume such proportions as to be of vital national significance.

"The figures, based on representative products and structures, show a possible annual cost saving of $1,825,000,000. This includes 7,000,000 tons of steel valued at $271,000,000 and 153,000,000 man-hours of labor. This saving in man-hours will place the industrial manufacturer in a strong position to compete in future world markets."

Naval Men Win Award

First grand award ($13,700) went to Capt. C. A. Trexel and A. Amerikian, director of planning and design, and designing engineer, respectively, Bureau of Yards & Docks, Navy Department, Washington, D. C. Subject matter: Caissons for naval dry docks. Former methods of calculation and design are discussed, and the new elastic slab method is presented, which is more applicable to welded construction. Designs were prepared for two large caissons of riveted construction. It was then decided to prepare alternate designs of all-welded construction. These were submitted for bids. Eight contractors participated in the bidding. The low bid for the two caissons of welded design was $108,030 lower than that for the riveted design, amounting to 25 percent of the cost. As a result, the Navy Department has let a number of other contracts for welded structures. Net savings for caissons built and under contract, $1,652,000. Savings on projected construction in the immediate future, $3,540,000. Savings in weight (projects built), 4200 tons; for caissons projected, 9000 tons.

John L. Miller, chief metallurgist, Gun-Mount Division, The Firestone Tire &

NOW 2300-VOLT MOTOR CONTROL IS NO LONGER A PROBLEM

Here's everything you need between feeder and motor in a single control unit

Pre-engineered for Your Job

Now, you can order a 2300-volt control unit as easily as you order a simple magnetic switch. Just tell us a few simple facts: the complete rating of your motor, its locked-rotor current, and the type of load it drives. We will deliver a factory-assembled control unit that meets every requirement of your job. These 2300-volt starters come to you as one complete unit with built-in short-circuit, overload, and undervoltage protection.

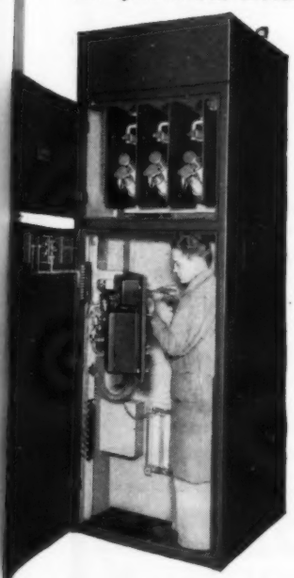
No Special Enclosures to Build

You don't have to build any costly, time-taking, protective enclosures for these starters. The starter and bus structure are enclosed in a sturdy, steel, dead-front cabinet in which the high-voltage compartments have been segregated to completely protect your personnel and equipment.

For a Wide Variety of Motors

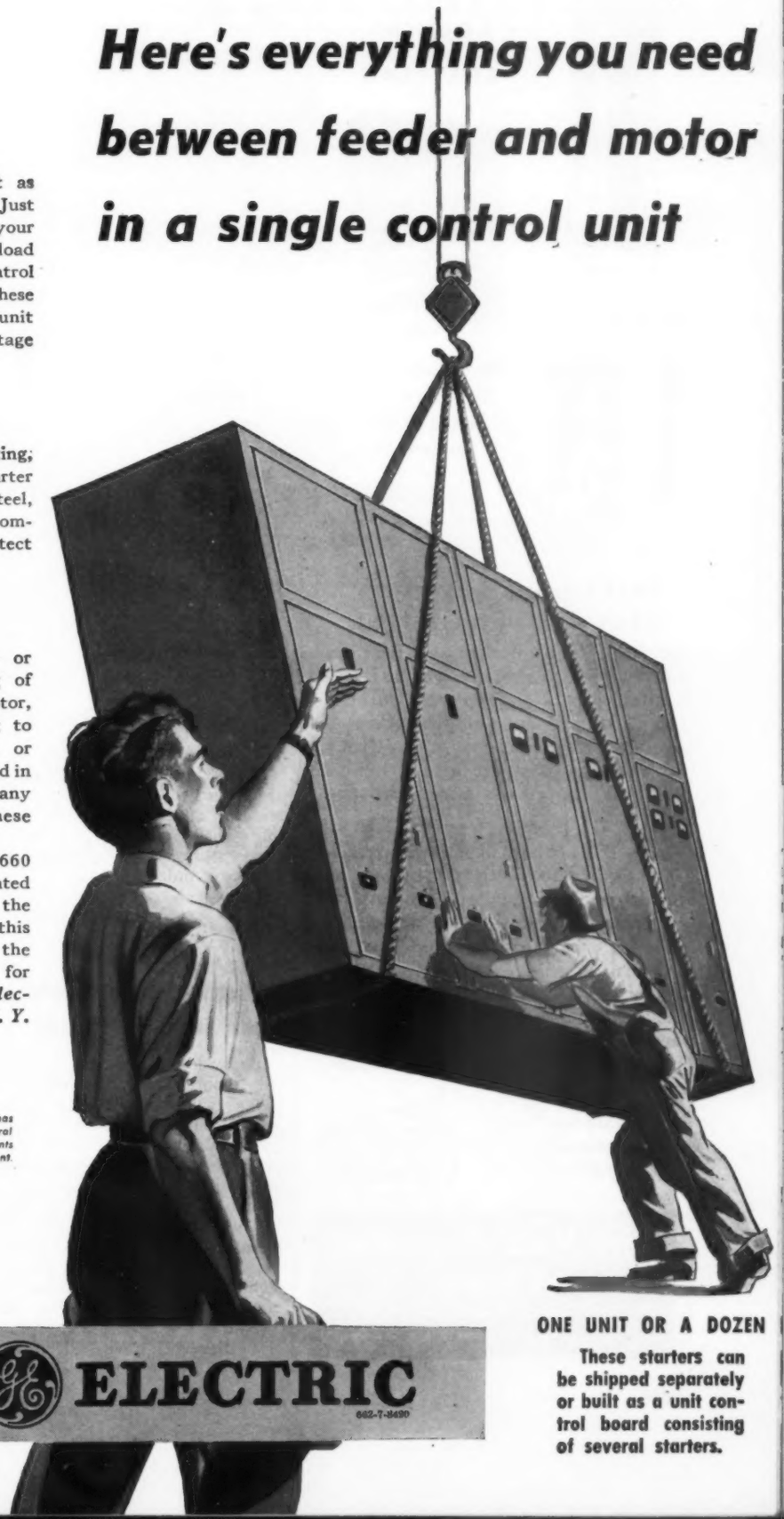
These starters are available for full-voltage or reduced-voltage starting, reversing, and braking of squirrel-cage, two-speed squirrel-cage, wound-rotor, and synchronous motors. You can get one unit to control one motor or have several combined in one board to control any combination of these motors.

Bulletin GEA-3660 gives a well-illustrated description of all the features that make this new starter tops in the 2300-volt field. Send for it today. *General Electric, Schenectady, N. Y.*



Neat in appearance, compact, and easily accessible.

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment.



ONE UNIT OR A DOZEN

These starters can be shipped separately or built as a unit control board consisting of several starters.

GENERAL ELECTRIC

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Penco
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STORAGE EQUIPMENT

LOCKERS
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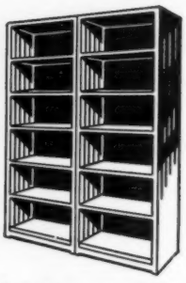
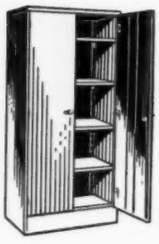
SHELVING



CABINETS



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COMPLETE LINE—
STANDARD STYLES AND SIZES
ENGINEERED CONSTRUCTION

For Your Emergency Storage Facilities

Don't neglect your storage facilities simply because steel equipment is not available. It still pays to boost workers' morale with adequate clothes lockers—to keep production running smoothly with shelving and cabinets for storage of tools, materials, parts, finished products.

Penco *Wood* Storage Equipment will give satisfactory emergency service. Sound, engineered construction assures superiority to home-made wood equipment. A variety of styles, sizes and finishes is available, comparable in many respects to steel. Consider wood lockers, shelving and cabinets for your immediate needs. Then ask for full information and prices on the complete Penco line.

Get the Storage Equipment you need now—in Wood!

1869 Penco

Penn Metal Corporation of Penna.
In Business Continuously Since 1869
26 Oregon Avenue, Philadelphia, Pa.

Rubber Company, Akron, won the second grand award ($11,200). Subject matter: This paper on the redesign for welding of the 40-mm. Bofors anti-aircraft gun describes how various parts were changed from riveted to welded design. The chassis and outrigger supports were redesigned with high-strength low-alloy steels and although only 30 percent more weight was added, strength was increased 50 percent. Cost per chassis was $76.80 less than riveted construction. The top carriage which carries the gun was redesigned for welding with a net saving of 17 pounds as compared with riveted construction of equal strength. Appearance was improved and cost was reduced to $10.37, excluding overhead or profit. The axles used in the foreign design were estimated at $110 each when made from solid bars by forging. Design, involving tubes and cast steel ends joined by welding, saved about $68 per axle. A number of other smaller parts were also redesigned to be welded. The total saving with 35,000 units is estimated at $6,000,000. While cost is secondary in a military program, the important factor here is the increase in production and the improvement in performance of final product.

Third grand award ($8700) went to H. Thomasson, welding engineer, Canadian Westinghouse Company, Ltd., Hamilton, Ontario. Subject matter: A new type of large mercury-arc rectifier, called "ignitron," has been built which requires extremely high vacuum. Arc welded construction was used, as it seemed not only the best but also the only way to secure the required tightness. On a number of items, an average of 47 percent was saved in cost by using arc welding instead of an alternate construction. This amounted to $63,000 per year for the company, which, at the same rate would be $166,000 for the industry. The main advantages of the new type rectifier are that it has greater reliability and about 1.8 percent higher efficiency than other types of rectifiers. The new rectifiers, which have been built, are estimated to save power valued at $670,000 per year. A portion of this saving is due to arc welding, since without it there is doubt whether the new type of rectifier could be successfully built. That the price of the new rectifiers is competitive is indicated by the large number of orders on hand.

•

Industry-Wide Pacts Seen in Bargaining

The widespread gains of unionization in the nation's recent history will be reflected before long in a growing tendency to regional and industry-wide collective bargaining machinery. That is the central conclusion of a recently completed survey of considerable scope conducted by the Twentieth Century Fund of New York.

After a study of 16 major American industries, including steel, rubber, automobiles, and the railroads, the Twentieth Century Fund stated its findings in a book entitled, "How Collective Bargaining Works."

William H. Davis, Chairman of the

It's a critical spot

. . . that place where cutting operations are performed—where cutting edge meets raw stock. Here every factor must be at top efficiency to make production move without interruption. Operating even with the finest tools and equipment, production can be made to suffer seriously if the coolant fails.

Pioneer Pumps for years have proved themselves reliable guards of coolant flow in the leading plants over the country. And today especially, when speed is the watchword for all industry — Pioneers, more than ever, are meeting the increasing demands.

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19644 JOHN R. ST.
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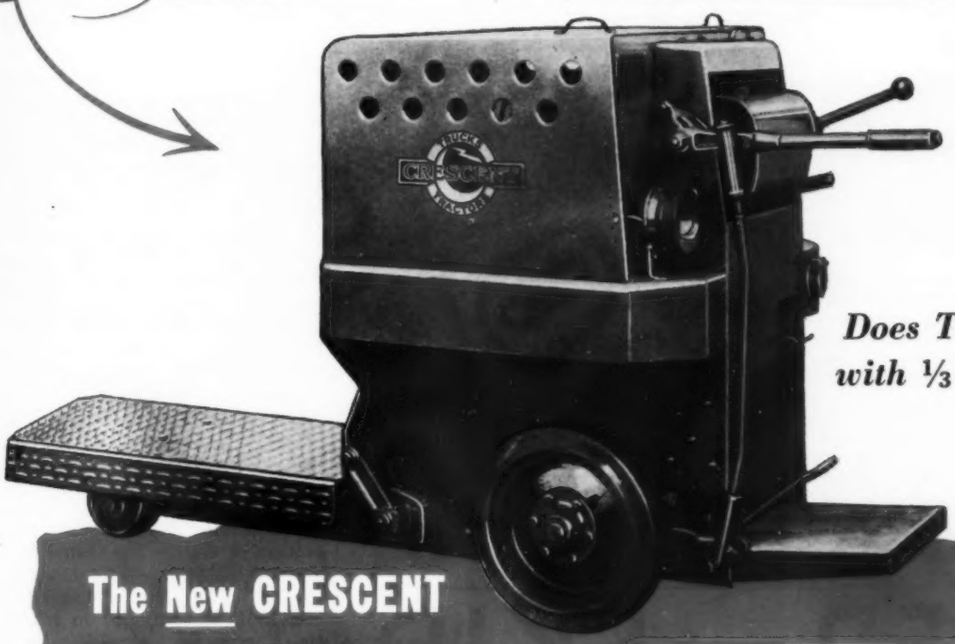
PUSH-PULL IS SLOW AND LABORIOUS . . .

"HITCH-HIKING" IS SLOW AND INEFFICIENT . . .

RIDE A LO-LIF-TOER WITH SPEED, SAFETY, ECONOMY



Does Twice the Work with ⅓ the Manpower

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LO-LIF-TOER

The Greatest Value Ever Offered in Electric Industrial Trucks . . . Amazingly Low Priced!

Motorize your hand truck operations with the *new* Crescent Lo-Lif-Toer! When your workmen ride a Lo-Lif-Toer, each truck haul is easier . . . more hauls can be made . . . and man-hours become more productive. The operator lifts, carries, lowers and steers the load without dismounting. Yet this production-boosting . . . labor-saving truck sells *complete with battery and charger* at a price so low it will amaze you! Why use larger, more expensive equipment to handle your loads up to 2500 pounds?

Speed your inquiry about the Crescent Lo-Lif-Toer . . . and you may speed-up your materials handling!

CRESCENTIZE CRESCENT TRUCKS TRACTORS *YOUR HANDLING*

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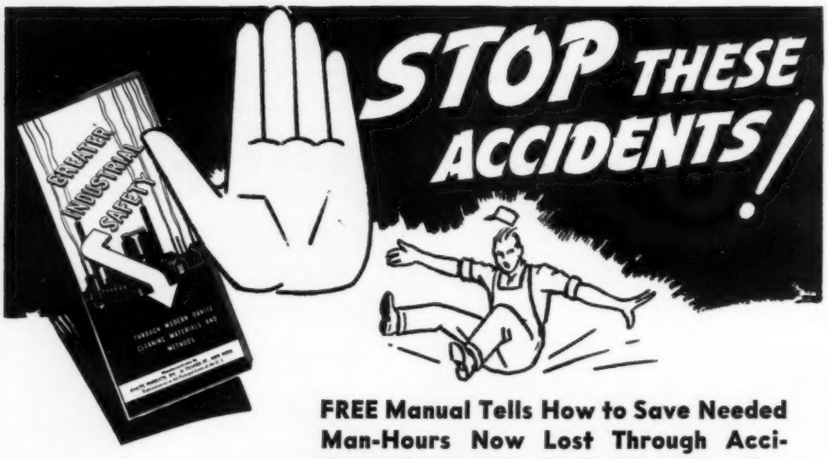
Send for Free Folder!

This folder . . . just off the press . . . gives you the facts about the New Crescent Lo-Lif-Toer Trucks. It's a guide to speedier, low-cost materials handling. Write for it today.



FREE Manual Tells How to Save Needed Man-Hours Now Lost Through Accidents Caused By Ineffective Cleaning

According to the National Safety Council, 18,000 workers were killed on their jobs by accidents in 1941! 1,570,000 were maimed or hurt! 180,000,000 man-days of production were lost!

Many of these accidents . . . some caused by slippery floors that were not thoroughly cleaned, others by fires and explosions resulting from the use of flammable solvents for cleaning and stripping paint with volatile paint removers . . . could easily have been avoided. This FREE Oakite manual tells how. Write for your copy. See how modern, SAFE Oakite cleaning can help you shackle the accident saboteur!

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OAKITE Specialized **CLEANING**
MATERIALS · METHODS · SERVICE — FOR EVERY CLEANING REQUIREMENT

SUPER SERVICE SKID for All-Out Production

The Service SteelWave
Lighter than wood
Stronger than a wood skid of equal capacity
Can't warp or buckle
Permanently splinter-free

• If the times call for supermen, their efforts deserve superior equipment. We offer, to keep things moving at highest efficiency, the unique SteelWave Skid. It's lighter, stronger, safer with less deflection under full load than a wood skid of equal capacity—because of the formed "waves" which give the metal construction its super-strength. Atmospheric conditions can't cause SteelWave to swell, shrink, warp or buckle. It won't splinter from age, jamming, loading or impact. Write for bulletin with full details.

SERVICE CASTER & TRUCK CO., 505 N. Brownswood Ave., Albion, Mich.
Eastern Factory: 434 Somerville Ave., Somerville (Boston), Mass.
Toronto, Canada: United Steel Corporation, Ltd., SC&T Co. Div.

SERVICE
KEEP 'EM ROLLING

National War Labor Board, is chairman of a special Labor Committee of the Fund which helped to outline the scope of the survey and supervised the work of the research staff, but which bears no responsibility for the findings themselves.

"Industry-wide collective bargaining seems a logical next development," said Chairman Davis. "It makes for greater stability throughout an industry, more responsible unions, and puts management on a more fair and equitable competitive basis so far as wage costs are concerned.

Employers Should Organize

"It seems to me that what we principally need now is more organization among employer and management groups. Such organization would do much to promote an equality of bargaining power between management and labor. As this Twentieth Century Fund survey abundantly shows, collective bargaining in America is coming of age. We can gain much by examining methods and practices, industry by industry, to see what practices have failed here, what methods have succeeded there, and using this experience to build a sound and mature structure of collective bargaining in this country."

Some measure of the growth of trade union membership since 1933 is given in an opening chapter, which discusses the increase in unionization of workers under the New Deal.

"Between 1933 and 1938 total trade-union membership rose from an annual average of slightly less than 3,000,000 to about 8,000,000. With business revival in 1939, following the recession of 1937 and 1938, it continued to expand," said the Fund. By early 1940, between 8,500,000 and 9,000,000 workers in the United States and Canada were attached to AFL, CIO, or unaffiliated 'outside' unions. The following year total membership approached 11,000,000."

These figures are given by Dr. Philip Taft, of the Economics Department of Brown University, who wrote a chapter in the survey. Research work for the survey as a whole was directed by Dr. Harry A. Millis, who selected the staff and edited the findings until he resigned in November 1940 to go to Washington to become Chairman of the National Labor Relations Board.

Few Unions Lost Members

A very few of the older unions have actually lost membership since 1933. Among them have been Wood Carvers, Metal Engravers, Sleeping Car Conductors, Rural Letter Carriers, Plasterers, and Stonecutters. For the most part, however, the curve has run upward.

"Membership in old and strongly entrenched organizations, such as the Brotherhood of Railway Carmen, the Photo Engravers' and Pressmen's unions, increased rather slowly—from 10 to 30 per cent from 1933 to 1941. The same was true of the International Typographical Union, the Sheet Metal Workers' Union and the National Federation of Post Office Clerks.

"But unions in coal mining, clothing, baking, and other industries grew by leaps and bounds. Between 1933 and 1941 the

We Want to Buy!

Have you a ***MATERIAL*** that can be used in place of ***Sheet Steel*** in the manufacture of these roof ventilators?

. . . . or do you know where such a material can be procured?

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We want to keep the leading line of ***Industrial Roof Ventilators*** available for *ALL* users—which includes the Army, Navy and War Industry—during the emergency. To do so and at the same time to conserve critical metal, we are attempting to replace sheet steel heretofore used. The material we are looking for should be durable, weatherproof, possible to fabricate and obtainable in large quantities. What have you to offer or suggest? *Write, wire or telephone to*

The Swartwout Company

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FOR BETTER CHAIN SERVICE
TAYLOR-MADE CHAINS

Protect Your Chains

Insure Safety of men
conserve steel
add years of chain service

1—Clean chains regularly. Don't let dirt, rust or grit put their fingers on your chains.

2—Inspect chain regularly.

3—Avoid kinks and knots. Protect chain at load corners and edges.

4—Don't overload. Follow SAFE WORKING LOAD ratings.

5—Be sure load is balanced.

6—Take up slack slowly.

7—Lower loads slowly.

8—Protect stored chains. Do not leave chains on ground or exposed to weather.

TAYLOR-MADE CHAINS

Toughest material. *Taylor* Heat Treatment, Taylor Electric Welding and Taylor Design mean *Dependability*. Note bulge inside *both* sides of links of Taylor-Made Alloy Sling Chain above—for greater strength.

Taylor-Made line includes chains for every load, pull, or use. Send for complete catalog.

Established 1873
S.G. TAYLOR CHAIN CO.
Box 509-FM HAMMOND, INDIANA

United Mine Workers' membership rose from 300,000 to 600,000, the Amalgamated Clothing Workers from 125,000 to 275,000, and the Brotherhood of Electrical Workers from 94,000 to 201,000. The Machinists more than tripled—from 65,000 to 222,000. The Bakery Workers, with some 84,000 members in 1941, showed about a fivefold increase, and the Teamsters, with over 400,000, almost a sixfold increase."

The report stresses spectacular gains "in hitherto unorganized, or practically unorganized, trades and industries. . . . The Steel Workers Organizing Committee (now the United Steelworkers of America) claimed in 1941 roughly 600,000 members; the United Automobile, Aircraft, and Agricultural Implement Workers, 600,000; and the United Electrical, Radio, and Machine Workers, around 300,000. Additional thousands of union members were in the rubber, aluminum, and flat glass industries. Other fields of economic activity, such as office and professional work, agriculture and canning, and editorial and commercial work on newspapers, have also been reached by the organized labor movement."

Summing up, the report says: "Collective labor agreements, therefore, cover . . . more than a quarter of the nearly 40 million wage and salary workers actually employed in 1941."

•

War Spurs Inventors, New Patents Show

The inventive mind of man is invariably stimulated in time of war. And the recent records of the U. S. Patent Office show a heavy influx of war devices among the usual run of "gadgets" and useful, if peaceful, contrivances. For example:

A new version of the "flying wing," similar to, but smaller than, the earlier-patented Northrop type. The inventor: David R. Davis of Los Angeles. Sharply V-shaped at the nose, the new type ends at the rear in a more modified V, giving the entire wing the shape of an extremely short kite.

Inventor Davis believes he has overcome a defect that has rendered similar models impractical in the past. To remedy unsatisfactory aerodynamic action at the wing tips, he has curved the front edges slightly forward toward the tips and then rounded the tips themselves. This gives the wing a better grip on the air.

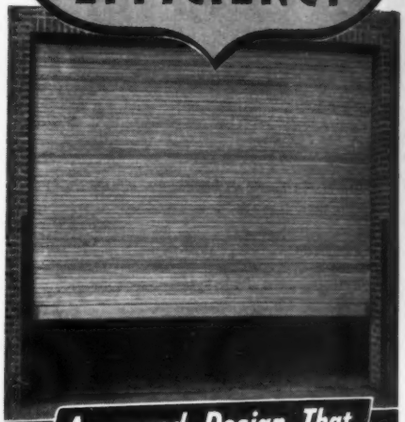
Davis has assigned the patent rights to the Manta Aircraft Corporation.

A new approach to the problem of sending secret radio messages which cannot be "jammed" by the enemy is embodied in a device patented by Francois Henroteau of Ottawa, Canada. Heretofore it has been easy to "jam" radio signals by sending out waves on precisely the same frequency. This produces howls and whistles that render the message unintelligible. Only short range, high-frequency signals have been proof against such tactics.

Henroteau proposes to maintain secrecy by distorting the sending set with a "key

KINNEAR
Wood
ROLLING DOOR

SAVES STEEL *and* PROVIDES EFFICIENCY



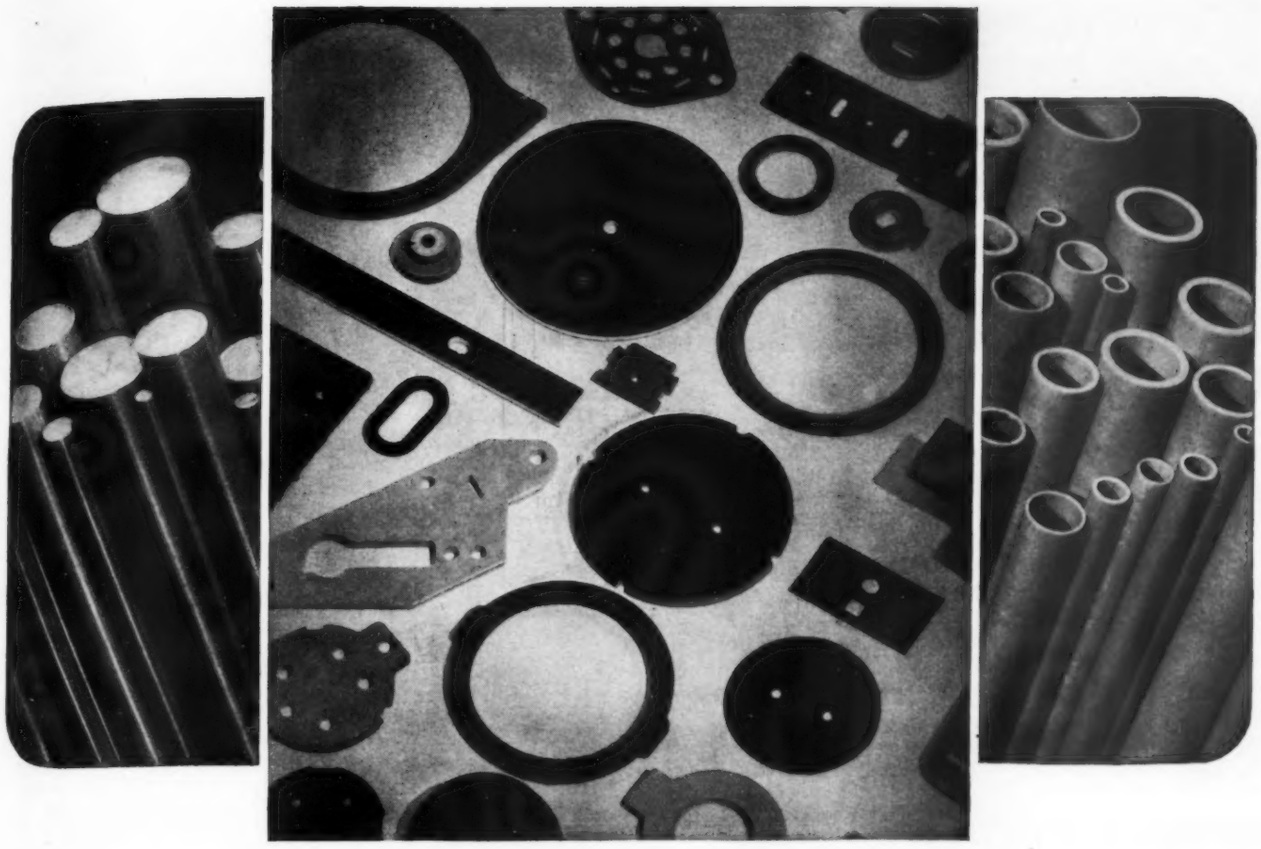
Approved Design That Fills Wartime Needs!

Makers of the famous Kinnear Steel Rolling Door again come to Industry's aid. Their WOOD ROLLING DOOR gives you maximum door efficiency for the duration. A door previously made—previously tested in service . . . . another door that incorporates the efficient principle of coiling operation proved for so many years in *steel* rolling door installations! A door that saves steel without sacrificing efficiency! The wood-slat curtain is assembled for strength, weather protection and smooth operation. Spring counterbalanced and coiling above the lintel, it is convenient . . . saves space . . . leaves an unobstructed opening . . . opens out of the way . . . is less subject to damage. Built in any size, manual or motor operated, and suited to old or new installation, it is the perfect answer to "duration" door problems.

The Kinnear Mfg. Co., 1540-60 Fields Ave., Columbus, Ohio.

Write Today
FOR BULLETIN 37

Saving Ways in Doorways
KINNEAR ROLLING DOORS



G-E LAMINATED PLASTICS

FABRICATED TO YOUR SPECIFICATIONS

G-E Textolite plastics in laminated form can be fabricated in an almost unlimited variety of sizes and shapes. Produced from standard laminated sheet, rod or tube stock, parts can be fabricated by any of the usual machining operations.

G-E Textolite laminated may also be sawed, sheared, punched, drilled, tapped or bored.

Many grades of paper or linen base materials are available to meet your demands for physical, chemical and thermal properties in the final application.

All fabricated parts are made to customers' specifications. Let us know your requirements—Write Sec. 0-11.

ONE PLASTICS AVENUE

PITTSFIELD, MASS.

PLASTICS DEPARTMENT

GENERAL ELECTRIC

PD-74

Gate Guards' Efficiency Doubled

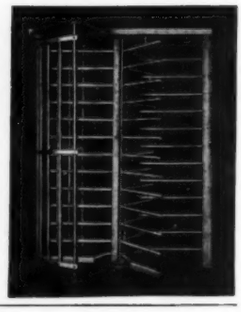
PEREY SYSTEMS aid guards in making identification air-tight and fool-proof.

When guards are reinforced with Perey Passage Control Systems they are less subject to fatigue, lowered efficiency and carelessness. Without these systems guards are never certain that saboteurs have not slipped by unobserved.

Perey Turnstiles never tire. They function efficiently and speedily 24 hours a day – seven days a week.

The automatic operation of Perey Systems gives added protection because the guard can devote all his attention to identification. His authority is backed up by this subtle combination of psychological and physical influences, compelling better behavior. *Write for booklet.*

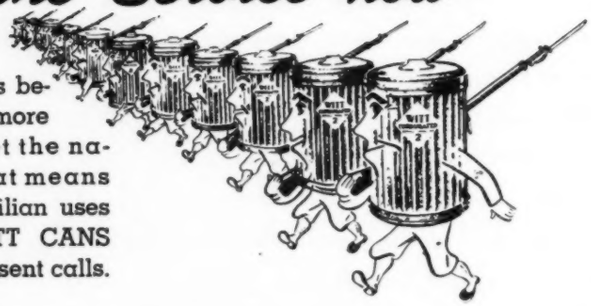
Perey Turnstile Systems are rapidly becoming standard protection equipment in our Navy Yards, Arsenals, Shipyards, Aircraft Plants, War Plants.



Perey Engineers are at your service to help you plan an efficient turnstile control system. They have had greater experience in the design and installation of turnstile systems than any other organization in the world.

PEREY TURNSTILE COMPANY
WAR PLANT PROTECTION DIV. 101 PARK AVE., NEW YORK

WITT Cans
are in the "Service" now



WITT production is being called upon more and more to meet the nation's needs. That means fewer cans for civilian uses —that's why WITT CANS cannot meet all present calls.

Helpful Suggestions
How to Care for Witt Cans

Paint cans inside with asphaltum paint. Paint name or symbol on cans and lids—prevents loss or theft of cans, and helps to identify them.

Never sprinkle or wet ashes before putting them in cans. Ashes contain sulphur and when wet, a mild sulphuric acid is formed.

The **WITT** *Cornice Co.*
Winchell Ave. Cincinnati, Ohio

plate" which causes an irregular variation of the wave. A similar key plate is used on the receiver to compensate exactly for the distortion. Thus the enemy would have to vary his interruptions with precisely the same pattern of distortions.

So much for planes and radio. Another new patent of war significance is that registered by Robert Brown of New York City for the production of a rubber-like substance from soybean or other vegetable proteins. Highly elastic, the new synthetic can be used, the inventor says, for a number of purposes for which rubber is currently required.

New Washing Machine

The inventors of machines suitable to peacetime use have not been idle. It is perhaps significant to students of post-war economic problems that the Patent Office continues to receive many applications for patents on household appliances and personal conveniences, to say nothing of gadgets of every sort.

For the duration, milady will probably have to get along with the washing machine she has now. But a new one may await her after the war in the form of an invention patented by Frank Breckenridge of Mansfield, Ohio. This machine simulates the "hand" treatment of delicate fabrics. A rotating basket with perforated, flaring sides alternately lifts the laundry, by means of vanes along the sides, and drops it gently back into the water, rubbing it against a slightly corrugated surface along the way.

When the water has been drained off, the basket can be rotated at high speed and the clothes partially dried thereby. Patent rights have been assigned to the Westinghouse Electric & Manufacturing Company.

In the field of gadgets, some articles are found which may, perhaps, have been inspired by the wartime need for substitution of critical materials. An example is a medicine-dropper type of bottle, patented by a drug dispenser, from which the rubber bulb has been eliminated. In its stead the top of the bottle is covered with a cellulose film in which are two small holes. The medicine may then be dispensed by allowing it to drop from one or another of the holes.

Other New Patents

Other recently patented gadgets include:

Wax-treated rayon shoe laces, said to hold a knot extra firmly.

A moistureproof salt shaker containing a valve that falls into place and securely seals the contents when the shaker is right-side-up.

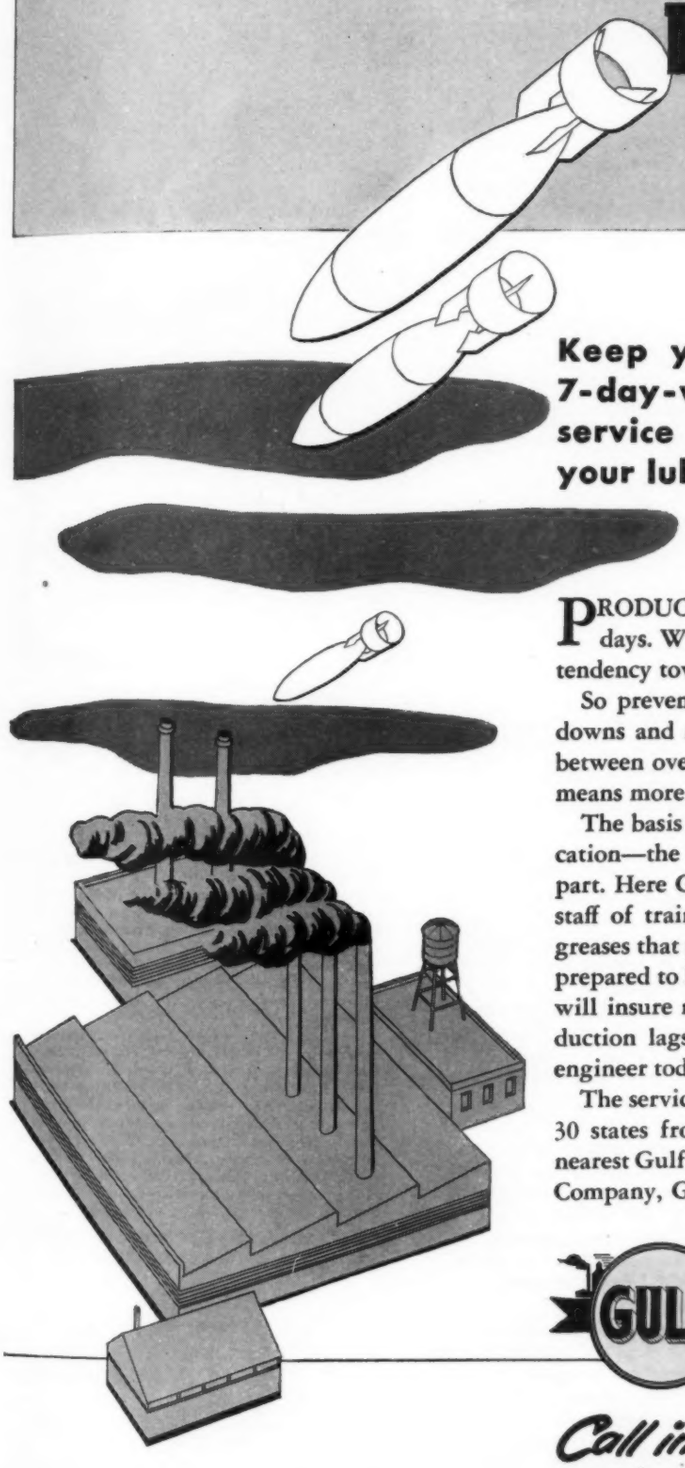
A lipstick, compact, and mirror combined in one device which, it is claimed, can be operated with one hand.

A radio receiver which does not re-emit squeals and howls picked up by other receivers nearby. (This has a wartime use. Seamen are sometimes tempted to smuggle radios aboard ship, even though they may reflect squawks from the ship's own radio which may, in turn, make the ship's presence known to enemy craft in the vessel's vicinity.)

A "bull control" which automatically

Excessive wear is a greater hazard to American Industry than

bombs!



Keep your machines in condition for 7-day-week production — call in a Gulf service engineer for helpful counsel on your lubrication problems.

PRODUCTION equipment gets a lot of punishment these days. Worked two to three times the peacetime average, the tendency toward excessive wear is that much greater.

So preventive maintenance—steps taken to minimize breakdowns and mechanical troubles and to stretch out periods between overhauls—is of vital importance. Saved machine time means more production!

The basis of *effective* preventive maintenance is proper lubrication—the right lubricant properly applied to each moving part. Here Gulf can be of considerable assistance. With a large staff of trained lubrication engineers — plus quality oils and greases that provide an extra margin of protection—Gulf is well prepared to help you install the kind of lubrication practice that will insure most efficient machine performance and fewer production lags caused by excessive wear. Call in a Gulf service engineer today and get the benefit of his helpful counsel.

The services of a Gulf engineer are quickly available to you in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

Call in a Gulf service engineer to help step up production—

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There is no substitute for quality. That is why all materials used in LIMA Electric Motor products are thoroughly checked, inspected and tested.

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LIMA built products are designed to give "top" performance under all operating conditions; they are built to take it without letting you down. Hundreds of letters from users are on file stating the severe conditions under which their LIMA'S are operating continuously without interruption.

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Every piece going into LIMA Electric Motor products has been designed to play a certain part in the life of that product. The oversize, special alloy-steel, ground shafts and the bearings used in LIMA Motors are engineered to carry loads many times the normal requirements.

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LIMA TYPE RS DRIP-PROOF ALL-PURPOSE ½ to 75 hp. BRAKE TEST

Large enough to successfully serve you, yet small enough to give personal attention to your needs.

The LIMA ELECTRIC MOTOR Co.
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tweaks a bull's nose if he attempts to force his way under or through a gate. It consists of a stick, the lower end of which is fastened to the nose ring and the middle to a band around the bull's head, while the upper end projects some distance above the head.

•

War Health and Nutrition Drive Launched by NAM

"All the machines in the world are worthless unless there are strong, capable workers to operate them. Management must know just what to do to keep its workers fit—and then do it."

These were the words of Dr. Victor G. Heiser, noted public health expert, author of "An American Doctor's Odyssey," and consultant to the National Association of Manufacturers' Committee on Healthful Working Conditions, as he announced a series of NAM-sponsored clinics on industrial health and nutrition.

In cooperation with local groups, the NAM will send Dr. Heiser and other noted speakers into the field to effect the exchange of information among manufacturers on the best methods of preserving the health of workers.

As for nutrition, Dr. Heiser has this to say: "Nutrition is like getting the right fuel into an internal combustion motor—the motor can't run without it."

•

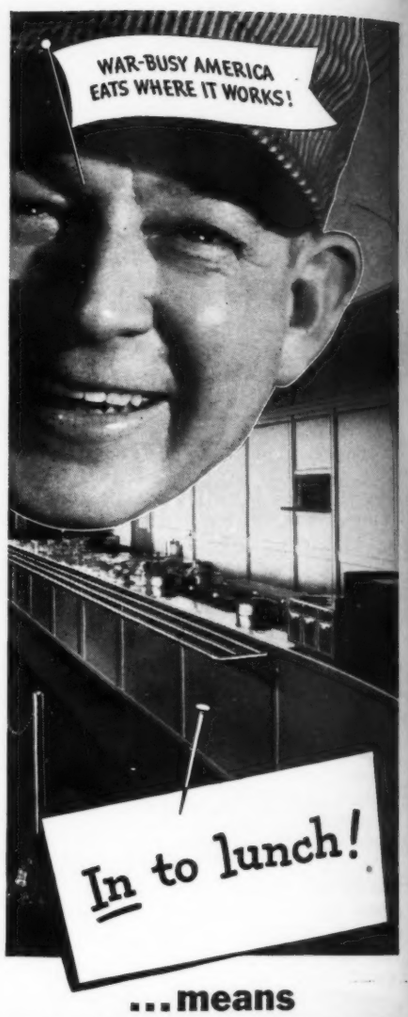
NAM and Davis Differ on War Strike Issue

War Labor Board Chairman William H. Davis took issue with a recent National Association of Manufacturers pamphlet calling attention to what the NAM believes to be the growing seriousness of strikes in war industries. Davis contends that despite "some wildcat strikes," organized labor has been successful in honoring its no-strike pledges of last January.

The NAM replied vigorously to Davis's criticism of its pamphlet, pointing out that the publication included a compilation of strike figures issued by the War Labor Board itself.

"It showed an increase in the number of strikes from 27 in January, when labor leaders pledged no strikes for the duration, and the War Labor Board was taking over this situation, to 222 strikes in July. It showed an increase in the number of men involved in strikes, from 11,605 in January to 80,722 in July. This latter was an increase of 700 percent in strikers.

"Mr. Davis asserts this increase is not alarming, because it is such a small percentage in the relation of man-hours lost to the number of man-hours worked. Reported in the same paper with Mr. Davis's interpretations of the strike seriousness is a dispatch from South Chicago, Ill., to the effect that 81 workers engaged in a jurisdictional strike for six weeks have delayed



...means BACK TO WORK SOONER!

Plant feeding SPEEDS plant production. Workers feel better because they're better fed, in pleasanter surroundings. Output rises because lunch-shifts can fit the working schedule, can even be shortened without discomfort. Management has fewer personnel problems where men who work together . . . break bread together!

Look into plants where minutes count—and you'll find Pick-planned, Pick-built cafeterias. Pick Engineers have had unequalled experience with mass feeding, under all conditions. They'll gladly sit down with you to study your problems and offer suggestions to fit your needs, your space, your budget. This entails no obligation. Send for our illustrated booklet No. PC8.

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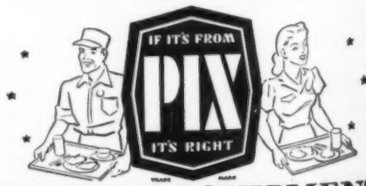

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For War Industries

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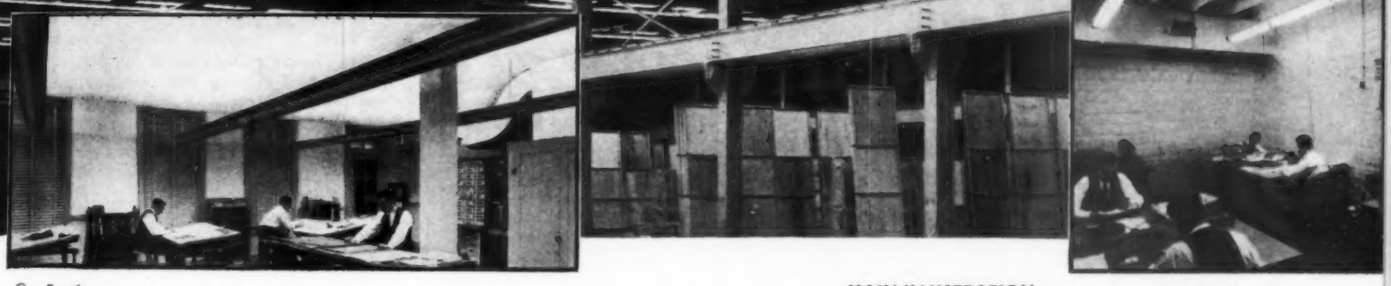

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INSET AT LEFT: *Drafting Room, with installation of* GUTH FLU-O-INDIRECT. *For 25 to 50 Foot Candles of totally Indirect lighting. Specify* GUTH *for highest quality illumination!*

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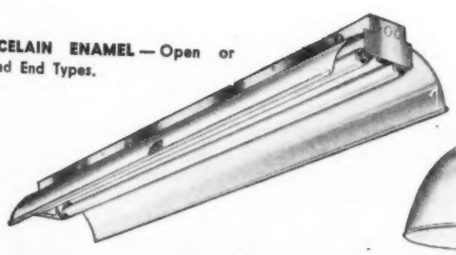

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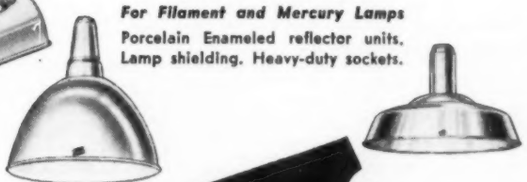

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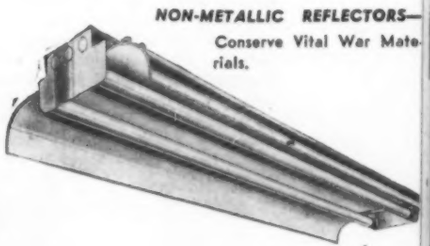

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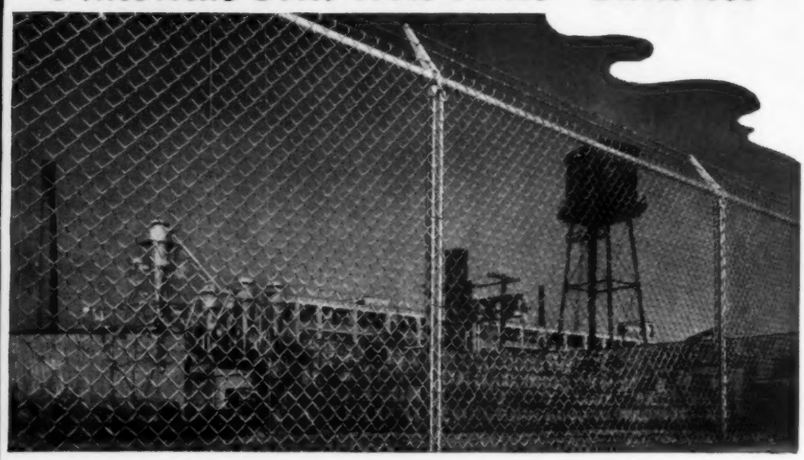

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● To keep 'em flying and rolling toward victory requires uninterrupted production, and continuous production requires protection against unauthorized entry to plant properties. ● Page Industrial Fence is the highest development in woven wire fence, originated in 1883 by J. Wallace Page and made for 59 years by the company he founded. This modern protective barrier is distributed by modern methods. Construction engineering and erecting are performed by local, responsible firms which are factory trained and long experienced—the 102 members of PAGE FENCE ASSOCIATION, Headquarters: Monessen, Pennsylvania.

VICTORY FIRST
At the Page mills, men, machines and materials are on an all-out schedule for production of fence to protect plants working on Government orders

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Speed Sweep Brushes

FOR FASTER, CLEANER EASIER SWEEPING

No. 411-14"
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LOTS OF 12

Wire-drawn tufts.
Adjustable handle.
Highest grade bassine fibre.
Narrow light weight block with Pressed Steel back.

Heavy Duty "Speed Sweep"—the ideal brush for heavy work through grease, cutting oils, metal filings, etc. High grade bassine tufts are compact and trimmed for "spring and snap action." Study its unique construction, and you'll understand why it does a better sweeping job in less time and with less work.

Double Duty "Speed Sweep" handles fine dust as well as heavy dirt. Two center rows of tufts are of heavy bassine to handle rough dirt while the outside rows are finer Union fibre to control fine dust particles. The general construction of Double Duty Speed Sweep brushes is identical to that of the Heavy Duty Speed Sweep.

Heavy Duty "Speed Sweep" Prices				Double Duty "Speed Sweep" Prices			
Size	6	12	24	Size	6	12	24
No. 410—12"	$2.25	$1.80	$1.60	No. 420—12"	$2.35	$1.95	$1.75
No. 411—14"	2.35	1.95	1.75	No. 421—14"	2.55	2.15	1.95
No. 412—16"	2.50	2.10	1.90	No. 422—16"	2.75	2.35	2.15
No. 413—18"	2.60	2.20	2.00	No. 423—18"	3.00	2.55	2.35
No. 414—20"	2.75	2.35	2.15	No. 424—20"	3.15	2.75	2.50
No. 416—24"	3.15	2.70	2.50	No. 426—24"	3.45	3.05	2.80

All brushes have 5¼" trim. Prices are f. o. b. Milwaukee

Speed Sweep brushes have been proved by so many firms and under such varied conditions that they are sold with an unconditional guarantee to meet your requirements. Full credit if you return brushes within 10 days. Order today. Shipment will be made promptly if you supply at least an A-10 rating and End Use symbols.

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for four months completion of a $60,000,000 alloy steel mill which would add 760,000 tons of capacity to the country's war steel production. Eighty-one workers is an infinitesimal proportion of the country's total labor force, but 750,000 tons of steel capacity held up is not infinitesimal in relation to the war effort.

"Would Mr. Davis argue that the desertion in the face of the enemy of a regiment of troops was unimportant because the proportion of deserters to the total armed forces was infinitesimal? It can be pointed out that since NAM's pamphlet was issued, Mr. Davis's War Labor Board's latest report showed that strikes continued to mount in August, and the number of man-hours lost increased from 1,868,912 in July to 2,130,824 in August. This brings the total of precious man-hours of labor lost in war industries to 11,176,080 for the eight months of this year.

"The public will judge whether it likes this growth and whether the war effort has been hindered by this mounting record of strikes."

•

Post-War Progress Seen in Current Discoveries

A strongly encouraging note to those who believe that the private enterprise system will dominate the post-war economy was struck in a recent address by Dr. Charles M. A. Stine, vice-president of E. I. du Pont de Nemours & Company, before the American Chemical Society.

That, at least, is the interpretation placed upon it by the National City Bank of New York in an article in its monthly economic review. The bank defines two schools of thought on post-war problems, one of which "throws the major emphasis upon government control and direction of the economy, together with a vast and more or less permanent program of government spending to supply purchasing power and provide employment."

Force of Private Enterprise

"The other school of thought places the main reliance upon the regenerative forces of private enterprise," the National City says. "To this school, government spending may serve as a cushioning element to alleviate distress and give time for recuperative forces to assert themselves, but never as a prime mover in recovery. . . . In most of the discussions of post-war planning there is a singular lack of imagination as to what the enterprise system can accomplish if given a real chance to function. The defeatist who would allow the issue to go by default and leave everything to the government should be encouraged by viewing the future through the eyes of the scientist."

Here is why the National City took heart from Dr. Stine's address: The du Pont executive considers that, under pressure of war, "our world of 1940 has become an antiquity."

"The inconceivables of only two years ago are today's realities," he says, "and

WE CAN'T DO A THING 'TIL THE CARPENTERS BUILD THOSE WORK-BENCHES ...PRODUCTION IS SURE HELD UP!
YOU SHOULD HAVE ORDERED "HALLOWELL" READY BUILT STANDARDIZED WORK-BENCHES

This will never happen to you, if you choose.. HALLOWELL

Fig. 928. "Hallowell" Work-bench. Laminated wood top. Drawer is extra.

SHOP EQUIPMENT

You can standardize on "Hallowell" Work-benches throughout your shop. Just choose the benches you need from the 1367 combinations available. Spare yourself all the trouble involved in building your own benches . . . no figuring and ordering lumber. "Hallowell" Benches are delivered promptly and ready to set up. Parts fit perfectly and are interchangeable. When placed they stay firm and rigid without costly, time-taking bolting to the floor. Tops are of smooth laminated wood, Masonite or steel if it's advantageous. Locked drawer units protect workers' tools. Get our Catalog for styles and sizes.

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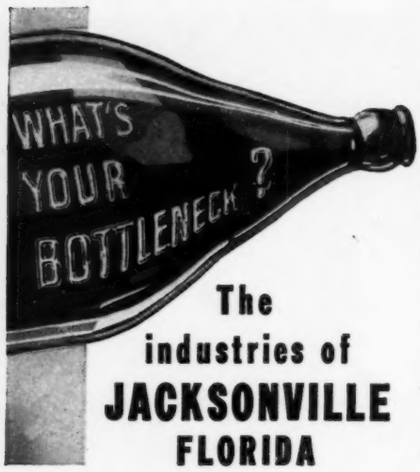

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SOLVE YOUR BOTTLENECK

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Learn today how Jacksonville's plants can help you!

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the war is compressing into the space of months developments that might have taken us half a century to realize if necessity had not forced the pace."

"We will have at our command ten, fifty, a hundred times what we had before, chiefly of new materials," Dr. Stine declared. "Fuels and metals and plastics are now ready to complete the revolution in transportation begun early in the century. The automobile manufacturer's slate has been wiped clean for a fresh start, which should result in new cars that will be incredible in efficiency judged by present standards. Since motor car production stopped, the shiny new models that are now gathering dust in dealers' storerooms have aged, technically, at least two decades. We are now in the 1960's of motor cars as measured by the old pace of development.

Fifty Miles Per Gallon

"Sealed cooling systems, proved on large scale by aviation, may end in the post-war car the nuisance of adding water to radiators. Weights may be half what they are now, power will be up, and fuels may yield 50 miles per gallon, or better.

"In housing, prefabricated sections, which easily may be handled by two men, will permit flexibility in architectural design. New insulating material, making possible light walls that will be several times as efficient as heavy masonry ones, will allow the use of revolutionary structural principles.

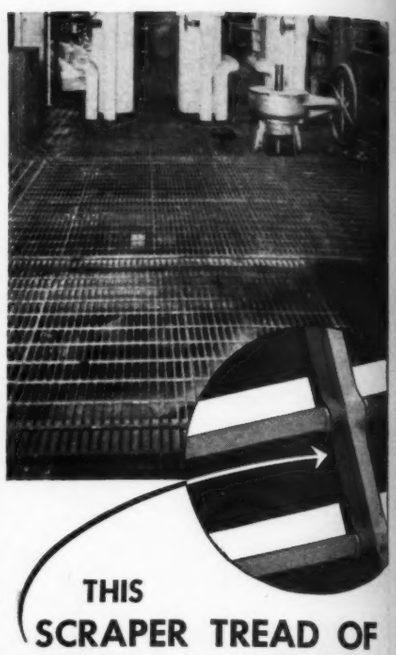
"Plywood, plastic, rustless steel, nonferrous alloys, various types of composition board, fire-resistant wood, ceramics, and synthetic finishes of lasting durability will be employed in profusion. For example, stainless steel is indicated as a common roofing material of the future. It will last as long as the house and requires no maintenance. Lighting will be automatic, governed by electric 'eyes' sensitive to outside variations in the daylight.

"We will have glass that is unbreakable and glass that will float, wood that won't burn, and laminations of plastic and wood that will compete with the structural metals. Hosiery derived from air, water, and coal, a wonder of pre-war days, is but the forerunner of many innovations from the same source, ranging from shoes that contain no leather and window screens that contain no wire, to machinery bearings that contain no metal."

Seven Times Greater

Dr. Stine also pointed out that national aluminum production by January 1, 1944, will be at a rate almost seven times greater than was attained in 1939, after fifty years of intensive development. The aluminum producing capacity being created will furnish in one year metal enough to build thrice the number of passenger cars now operating on all American railroads. To produce this aluminum will require more electricity annually than was consumed in 1940 in 27 of our 48 states.

"Until a few years ago magnesium was a structural curiosity. Today almost half a ton of it (recovered mostly from sea water) on the average is going into every American fighting plane that is built. After the war



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This extra cleanliness and safety come with the use of welding technique that, for years, has been recognized as the correct method to follow—a simple fillet weld.

There is no burning and no overflow of surplus metal around the fillet into which is press-welded Bates Hex Bar Stock. You get top strength and rigidity in steel flooring that permits the maximum passage of air and light.

Write for the new catalog "FILLET WELD BATES - GRATES" that gives complete details—well illustrated to show how advantages of this open steel flooring can be used in your plant.

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● In a wide range of industries . . . on a vast number of machining operations, En-Ar-Co PROMAX Cutting Oils permit *higher surface speeds* and heavier cuts with better finishes . . . all with greater production between tool grinds.

For instance . . . in the production of projectiles for the U. S. Government, PROMAX Cutting Oil *increased production between tool grinds 30% and eliminated discoloration of copper parts.*

With the insistent demand for greater and greater production . . . with closer and closer tolerances, it becomes highly profitable to look into the performance records of PROMAX Cutting Oils.

Write today about the type of PROMAX Cutting Oil best adapted to your individual production needs.

● For over sixty years The National Refining Company has pioneered in the development of Industrial and Motor Car Lubricants. Our engineers are at your service to help you solve your lubrication problems.

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Neither accident nor negligence is an excuse for work stoppage or labor shortage! Halsey Taylor Drinking Fountains successfully guard against the danger of contamination due to improper drinking water devices. For Halsey Taylor coolers and fountains possess patented features that promote sanitation and convenience! Write!

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AUTOMATIC STREAM CONTROL — TWO-STREAM PROJECTOR

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DRINKING FOUNTAINS

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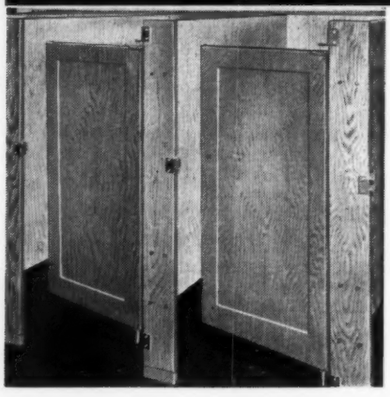
READY! For New Factory Washrooms

... NEW LOW COST PREFAB-PLYWOOD *Partitions...*



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Made of Fir Plywood, attractive, sturdy, durable, Prefab-PLYWOOD Partitions save you time, labor and money on every installation. Developed by the makers of famous Ferro-Metal Partitions, they promise sure satisfaction in wartime washroom facilities at a new low cost.

Write or WIRE for prices and specifications TODAY!

MILWAUKEE STAMPING COMPANY
809-P South 72nd Street
MILWAUKEE, WISCONSIN

the nation's capacity for producing this lightest of all structural metals will be more than double its aluminum output of 1939.

"Our aviation industry is establishing facilities for the manufacture in one year of almost double the number of planes introduced throughout the 37 years of its history, beginning with the Wright brothers at Kittyhawk, and culminating in the defense program."

•

War Labor Board Plans Regional Offices

The War Labor Board, mightily pressed by requests for adjustment of wage disputes, now plans to decentralize.

Ten regional offices will be opened in the near future, according to Chairman William H. Davis. The location of the branches was not immediately announced. The Board's new outposts will facilitate the request of employers for attention to their cases, but will not have policy-making or decisive powers over individual requests for wage adjustments.

Board policy, as a matter of fact, appeared to have been materially clarified by recent rulings following the enunciation of the "Little Steel" formula. This policy prescribes roughly that wage increases will not be granted in cases where previous increases, from January, 1941, to May, 1942, have equaled 15 percent, the approximate increase in the cost of living during the same period.

No less than 115,000 Ford Motor Company employees were involved in the first significant big test of the formula. And the War Labor Board turned down flatly a demand for a pay increase of $1 a day by the Ford local of the United Auto Workers CIO. A union demand for a 10-percent bonus for night-shift workers was likewise rejected.

Wage Increase Refused

In another instance the Board refused to approve a wage increase negotiated between employers and employees in normal collective bargaining procedure because, the Board held, the wage rate agreed upon exceeded the 15 percent provided in the formula. This occurred in the case of the General Cable Company of Rome, N. Y., which had agreed to a wage increase of 7 cents an hour following negotiations with the Cable Guild, an independent union.

Chairman Davis made it plain, however, that "discrimination" would constitute grounds for exceptions to the 15 percent formula. In the course of an address before the Trade and Commerce Bar Association in New York, he said the 15 percent yardstick would constitute a *prima facie* test of a union's right to request a wage increase.

"In applying this *prima facie* test, however the Board has taken into account at the same time the other tests of unusual or unreasonable discrimination," Davis declared. "The decision of the Board indicates that it will consider real injustices that arise from discrimination in wages

TAFT-PEIRCE GAGES were used in controlling dimensions of military materiel for years before this war began . . . and in industry for years before that. Today the Taft-Peirce Gage Division is a sizable industry in itself, producing one of the world's most complete lines of standard and special gages . . . thousands of which are preserving precision and saving time in arms, munitions, and aircraft production . . . consistently and accurately measuring the maximum amount of work per gage.

THE Taft-Peirce MANUFACTURING CO.
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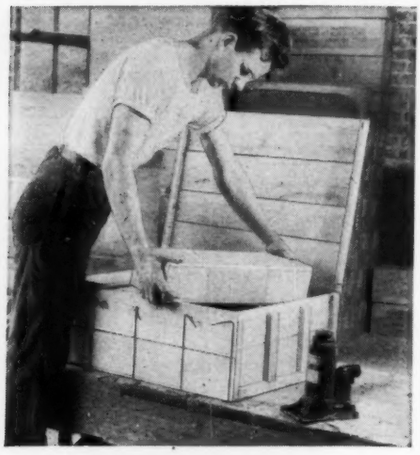
GENERAL BOXES



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They are now being used by hundreds of war goods producers for both overseas or overland shipments. Delays in delivery schedules are being eliminated by these durable containers—foods, chemicals, metal parts, munitions and other materials are kept moving to the armed forces. General Containers assure adequate protection with minimum tare weight.

General Box skilled technicians will help you determine the box, crate or special container which will best meet today's requirements—will show you how to get your products to Uncle Sam sooner and onto war products assembly lines faster. Our 13 strategically located plants permit faster service to concerns in all parts of the country. Mail the coupon.

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between jobs in the same plants or between comparable jobs in the same locality, or between comparable jobs in the same industry, provided these discriminations are unusual or unreasonable, so that they justly lead to a feeling of insecurity or frustration on the part of the workers involved."

•

Taxpayer Rolls Gain 91.5 Percent in '41

The effect of lowering exemptions, plus reemployment of the unemployed, combined to bring an increase of no less than 91.5 percent in the total of income tax returns filed last year on 1940 incomes, according to the Treasury Department.

However, only 7,504,659 of the year's 14,778,159 returns proved to be taxable. The balance paid nothing because exemptions and credits exceeded net income. No estimate has yet been placed on the probable additional large increase in returns which this year will undoubtedly reveal.

•

Tells Plan for Effective Employment of Women

By far the most spectacular increase in the employment of women has occurred in the aircraft industry where the number on production work grew from a little over 2000 a year ago to 50,000 today, according to Mary Anderson, director of the Women's Bureau of the United States Department of Labor. Whereas the 2000 were employed mainly on inspecting sewing, and upholstering jobs, Miss Anderson told a recent meeting of the New York Chapter of the Society for the Advancement of Management, today's 50,000 are working on almost every sort of job except those requiring heavy lifting.

Occupational analysis studies carried on in key war industries, Miss Anderson declared, show that women are qualifying not only for simpler jobs, such as drill press operation, light assembly work, inspection, and the like, but are proving readily adaptable to more skilled operations including turret lathe and hand screw machine work, sheet metal forming, riveting, spot welding, operating woodworking machines and automatic screw machines. Some, she said, are even operating electric cranes.

Miss Anderson brought to the attention of her audience a 12-point program, drawn up by the Labor Department Women's Bureau, for the most effective employment of women in war production. The program follows:

1. Careful recruitment and selection (with the aid of public employment offices) of women employees; with elimination of inept and undesirable women at the hiring desk by means of competent interviewers and aptitude and personality tests; but with no discretionatory practices because of sex, race, middle-age, or religion of applicants.

2. Adjustment of the physical plant and

HOW TO convert plants and produce more and better war goods

HERE IS YOUR KEY to the problems of getting war production contracts, converting quickly and effectively to war production, and meeting wartime requirements for faster, better output. It brings you practical information in tips on threading the complexities of conversion and procurement, check lists of things to do and not to do, pointers on relationships with the government, and fundametals, methods, and suggestions in profusion, for planning and controlling production, improving operations, and bringing your plant up to the efficiency required.

JUST PUBLISHED

HANDBOOK OF WAR PRODUCTION

By EDWIN ARTHUR BOYAN

Research Associate, Department of Business and Engineering Administration, Massachusetts Institute of Technology

368 pages, 6 x 9, price only $3.00

THIS handbook shows how to get best results in problems specifically associated with the war effort—arranging contracts, subcontracting, procuring materials and supplies, estimating, converting the plant, etc. It also covers planning and control, labor, inspection, salvage, industrial accounting, and other production factors ordinarily important to the manufacturing enterprise, giving the pointers and methods especially vital under wartime conditions and requirements.

Gives such practical helps as:

—over-all approach and technique to follow in the maze of contacts and relationships that must be developed in contract procurement
—pointers on determining nature of government requirements, how to handle bids, reasons for failure to get contracts, etc.
—major steps to be taken in conversion
—concise treatment of work simplification, including lists of 300 questions that indicate points for improving processes and operations
—duties of a priorities division; place in the organization; simple technique for follow-up of promises by supplier
—pointers on handling supervisory training, training on the job, and personnel policies
—how to determine what and how much inspection is necessary
—suggestions for cooperating with government inspectors
—how to set up and operate practical salvage systems
—example of careful and rapid bid development method etc., etc.

Based on tested methods

Valuable information secured in direct contacts with numbers of successful war production plants is here organized and presented in a form to give you a quick view of the fundamental problems—the techniques of approaching them, getting information specific to your own plant and making use of it—and many practical methods for direct application.

ERWIN H. SCHELL says in the Foreword: "It is a working tool which the manufacturer may put to immediate use when undertaking production for the nation."

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Send me Boyan's Handbook of War Production for 10 days' examination on approval. In 10 days I will send $3.00, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

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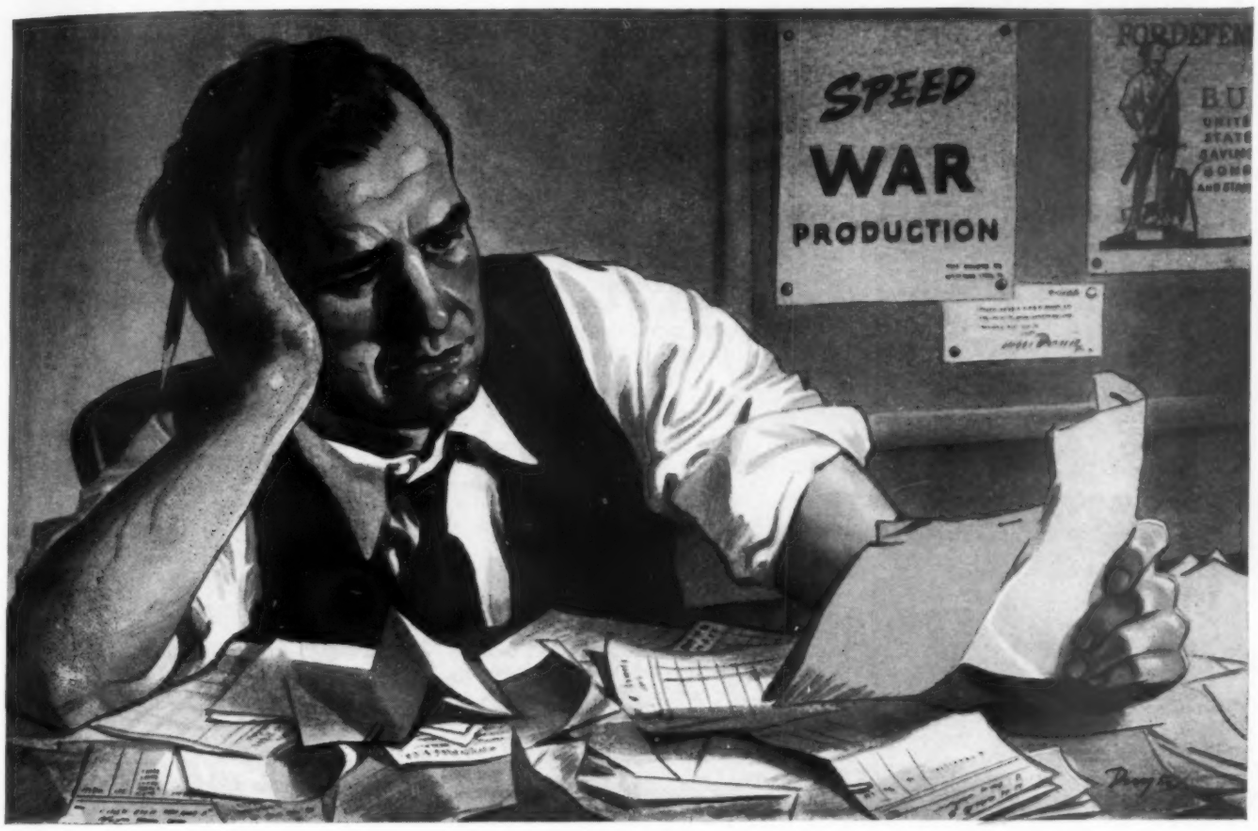

So was I—'til I put it up to STANDARD!"

TODAY—on 3 shifts, 24 hours—paper shuffling will cost the war effort millions of man hours. And America will pay the price in LOST PRODUCTION—vital war production stolen by red tape.

You *must* have systems of control—whether hand or machine written. You can't do business without them. But you *can* simplify them. You *can* make them function faster and better. You *can* save countless hours by reducing paper work and, at the same time, have systems that greatly aid the flow of your war-time production.

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Please understand us. We do not sell "cure-alls," nor vast routine-wrecking methods. We do offer you *faster writing* with *better designed forms*—and *better* control over every function of production from purchasing through shipping.

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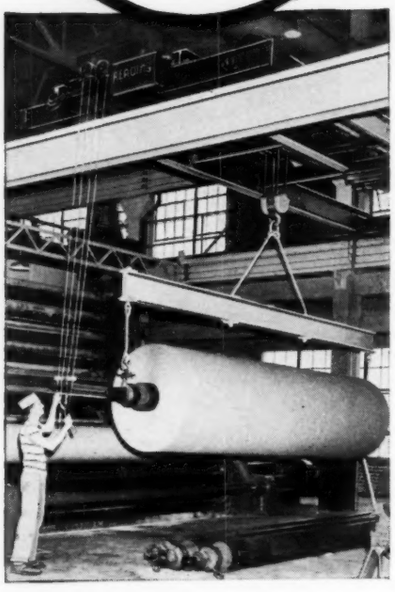
How to KILL OFF Maintenance Hours!



Here is more proof that it pays to *standardize* on Reading Cranes!

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operations to women in any essential ways, such as changes in production departments and machinery; installation of mechanical labor-saving devices and service facilities.

3. Training of women by means of: (a) Such government-financed programs as vocational training for war production workers (which includes pre-employment, refresher, and supplementary courses), and engineering, science, management, war training on the college level; and (b) well-planned in-plant training on the various levels from the orientation courses to those for upgrading and job instruction as sponsored by the Training-Within-Industry Section of the War Manpower Commission.

4. Supervision by carefully chosen personnel, having an understanding of women's problems and abilities preferably with competent women as personnel counsellors and immediate supervisors wherever feasible.

5. Fair wage policies, with the same wage rates (including entrance rates) for women as men, and the same system of wage increases.

6. Optimum working hours of 8 a day and 48 a week, one day of rest in 7, 30-minute meal period, a 10-minute rest period in each half of a work shift, and rotation of women on shifts in accordance with scientific findings as to health and efficiency.

7. Work clothing that is safe, comfortable, practicable, durable, and attractive; sensible, low-heeled shoes; when necessary, caps to protect the hair, and other accessories, such as gloves, goggles, masks.

8. A carefully planned and conducted health and safety program to prevent industrial injuries and diseases, with special precautions against those to which women are peculiarly liable or susceptible.

9. Posture seats, adjusted to the work and the worker; with prevention wherever possible, of constant standing or constant sitting.

10. Scientific modern lighting and ventilating equipment to prevent undue fatigue, to increase efficiency, and to preserve quality output.

11. Adequate service facilities, including a place for eating away from the workroom and provision of inexpensive, nourishing food; lockers and restroom; sufficient number of modern toilets, first aid equipment, and medical care for emergencies.

12. Adequate community facilities to guarantee satisfactory living quarters and eating arrangements, wholesome recreation, essential medical care, and sufficient transportation to and from work—vital factors in preventing absenteeism and labor turnover and in maintaining production.

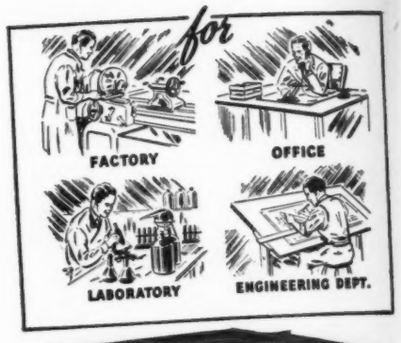
•

Union Leaders Named for Harvard Course

Fourteen trade union representatives are "matriculating" at Harvard University to continue a little-known new experiment in education.

The fourteen constitute the second group of Labor Fellows selected by their

YEAR-ROUND AIR CONDITIONING



Cutaway view, YOUNG Horizontal STREAMAIRE Air Conditioning Unit.

Young STREAMAIRE AIR-CONDITIONING

FOR WAR PRODUCTION

Cooling . . . Heating . . . Humidifying . . . Filtering . . . complete Air Conditioning and Ventilation . . . you get them all with YOUNG STREAMAIRE AIR CONDITIONING units. YOUNG's perfected year-round air conditioning will enable you and your men to do better work and more of it. That's mighty important these days. There is a YOUNG STREAMAIRE unit of the right size and type for your particular requirements. Choose from sixteen models—eight horizontal and eight vertical—capacities from 400 to 16,625 CFM.

All YOUNG Products—air conditioning units, convectors, unit heaters, heating and colling coils, etc.—are precision built of highest quality materials. Write for engineering data and complete information.

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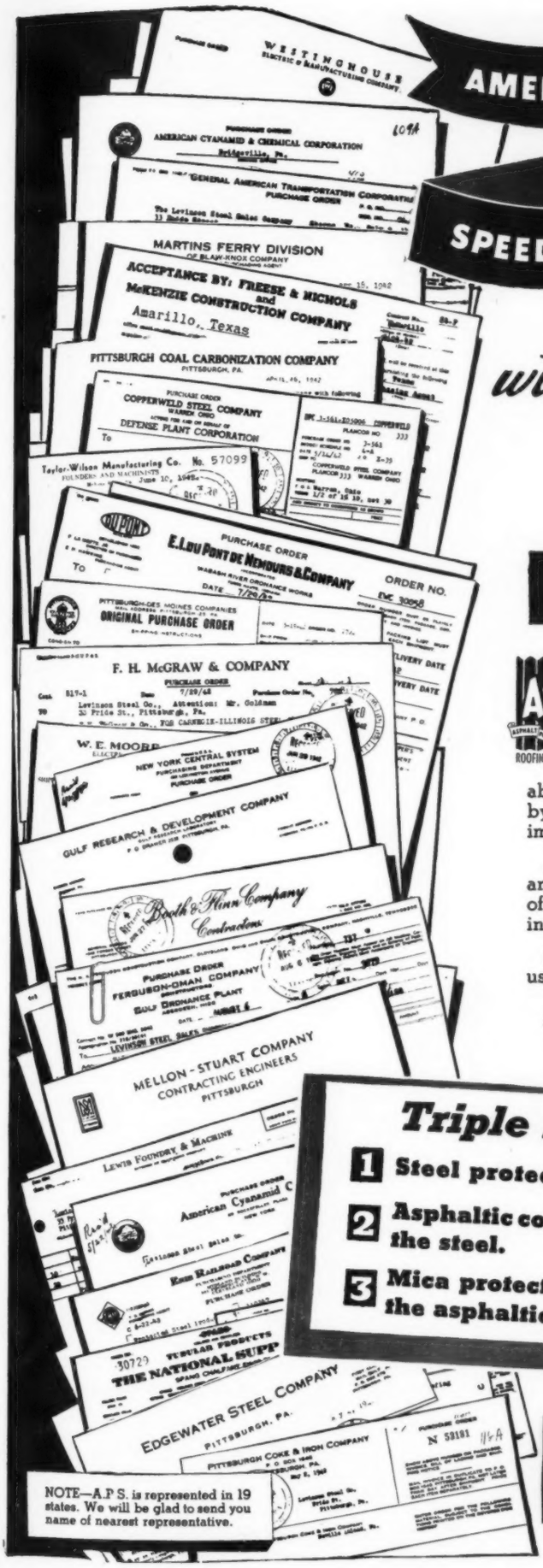
BUY WAR BONDS—SALVAGE SCRAP



AMERICA'S MAJOR INDUSTRIES SPEED WAR CONSTRUCTION with APS

ASPHALT PROTECTED STEEL ROOFING AND SIDING

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Here's a Roofing and Siding that has won the instant favor of the country's leading industries for speedy, economical war-time construction. **A.P.S.** is an asphaltic coated product . . . rugged, durable, weather resistant, easy to erect and quickly available! Its resistance to extreme climatic conditions is proven by A. S. T. M. laboratory test methods, and in addition it is impervious to acid fumes and acid gases.

A.P.S. is obtainable either flat or corrugated. Corrugating and forming operations are performed after the application of the protective coatings. It is furnished in all types of flashing, ridge roll, gutters, etc.

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NOTE—A.P.S. is represented in 19 states. We will be glad to send you name of nearest representative.

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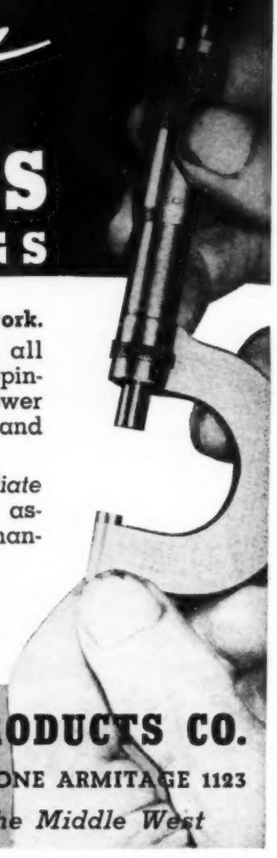
Precision METAL SPINNINGS AND STAMPINGS



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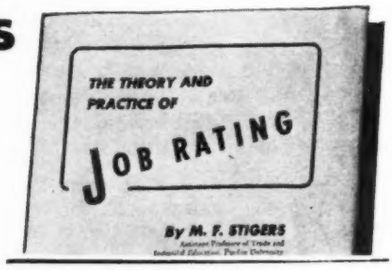
Largest Metal Spinning Plant in the Middle West

How to rate jobs

- **for greater incentive**
- **for increased production**
- **for balanced purchasing power**
- **for better employee relations**

Here is a book to help you rate every job in your plant accurately, set wages scientifically on such a job-rating plant, measure even the so-called intangibles on any job. It is the first published in this country to give a basic understanding of the fundamentals or theory of the actual practice of job rating and to present an accurate and scientific technique for the actual work of job rating.



Some questions answered in this stimulating book

—should not wages be set on supply and demand instead of being based on the results of a theoretical calculation?

—what should be done to a rate when there is a temporary shortage of skilled labor to fill a special job?

—why not pay the "going rate" of the community?

—what effect should profit and loss have on wages?

—can the value of all types of labor and of technical and managerial positions be calculated?

Just Published

The Theory and Practice of Job Rating

By M. F. Stigers, Purdue University, and E. G. Reed, Reed Laboratories, Inc. 154 pages, $1.75

Noteworthy for its original and unusually factual approach to job rating, this book offers an accurate, practical means of measuring every job element—including the intangibles heretofore considered unmeasurable. The fundamentals and philosophy underlying the subject are discussed; a scientific technique for the actual evaluation work is given; and questionnaires, rating scales, a cross comparison procedure, and pertinent data, plus full instructions, are provided. Employers and employees alike can understand this approach, and appreciate its substitution of facts for the opinions of rators. See how you can use it; send for a copy of the book to examine and read, today.

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unions to study for nine months under auspices of the Harvard Graduate School of Business Administration, the Littauer School of Public Administration, and the Harvard Department of Economics.

The fellowships held by these students are financed jointly by the unions and the university under a plan originating with the unions. The objective is to create a better understanding between labor and management. The Labor Fellows are not required to meet definite scholastic standards, but are supposed, by the fact of their election by fellow union members, to possess general intelligence, capacity for leadership, and devotion to the labor movement. Most of them have been shop committeemen, local union officers, or national representatives.

Weekly dinners and evening meetings are held, featured by visits from national labor presidents and government labor officials. In seminars, the men study "Economic Analysis," "Trade Union Problems and Policies," and "Human Problems of Administration."

The first group of Labor Fellows included representatives of unions of railway clerks, ladies' garment workers, hatters, and electricians. Among the new Fellows are men from unions representing hosiery workers, retail clerks, electrical and radio workers, painters and decorators, and additional members of the railway clerks, ladies' garment workers, and hatters unions.

•

Hard-of-Hearing Workers Now Finding Jobs

The war is opening doors to deaf and partially deaf men and women who previously have had a much more limited chance of finding employment.

While exact statistics are unavailable, it is estimated that there are probably 5,000,000 hard-of hearing persons in America, including women and children. Officials of the United States Employment Service report that they are having little difficulty in placing persons with deficient hearing in industrial jobs. The employment service of the New York League for the Hard-of-Hearing had a constant backlog of 300 to 500 job-seekers before the war, its officials point out, whereas today the League has a waiting list of prospective employers.

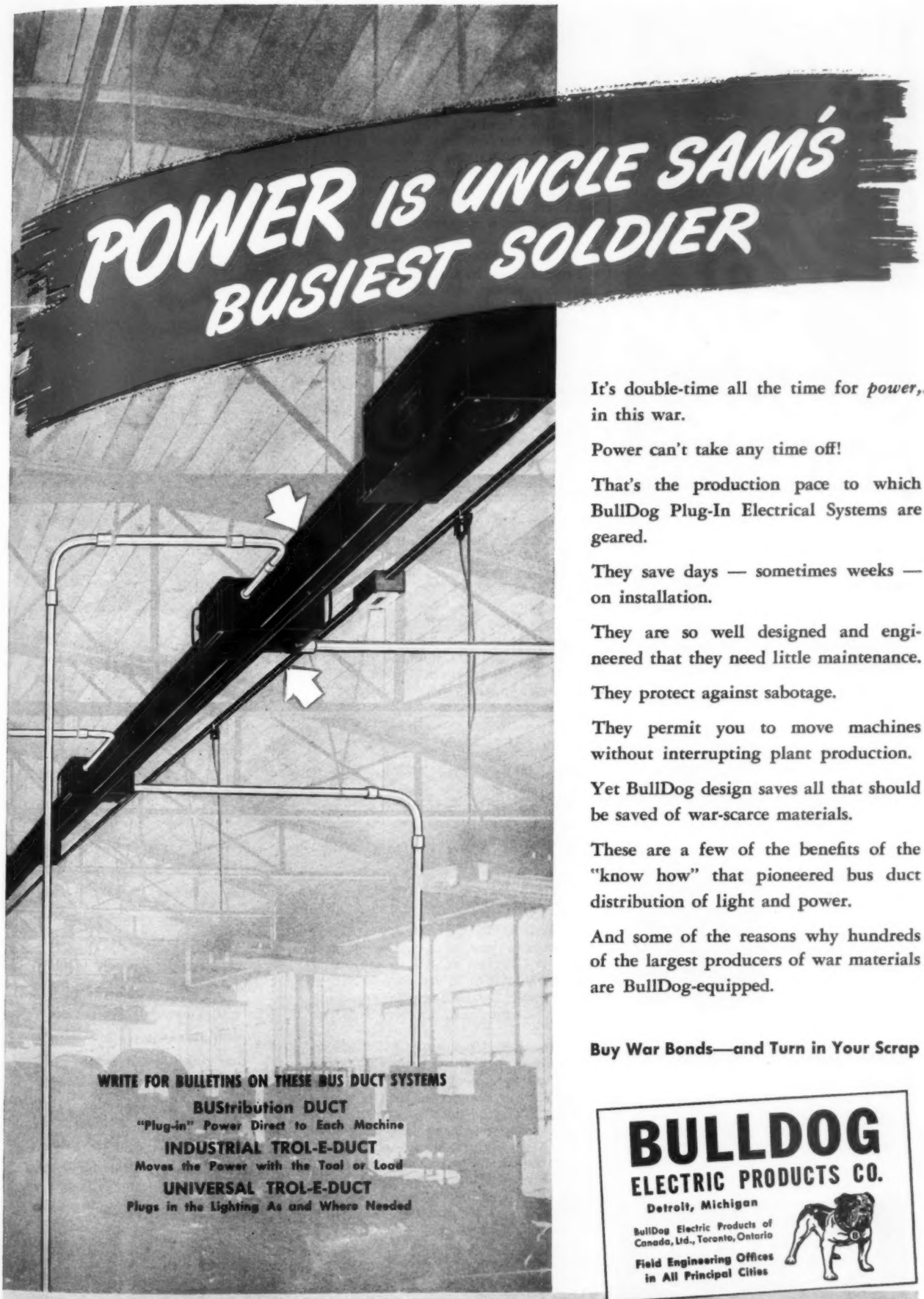
League officials say that employers are finding hard-of-hearing persons especially acceptable for jobs requiring concentration.

•

Epoch Ends as Lewis Takes UMW out of CIO

An epoch in the history of American labor ended at Cincinnati not long ago when the United Mine Workers, led by John L. Lewis, officially withdrew from the Congress of Industrial Organizations.

When the UMW session ended, John L. Lewis, its president, walked alone once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It's double-time all the time for *power*, in this war.

Power can't take any time off!

That's the production pace to which BullDog Plug-In Electrical Systems are geared.

They save days — sometimes weeks — on installation.

They are so well designed and engineered that they need little maintenance.

They protect against sabotage.

They permit you to move machines without interrupting plant production.

Yet BullDog design saves all that should be saved of war-scarce materials.

These are a few of the benefits of the "know how" that pioneered bus duct distribution of light and power.

And some of the reasons why hundreds of the largest producers of war materials are BullDog-equipped.

Buy War Bonds—and Turn in Your Scrap

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STOP SABOTAGE IN THE BOILER ROOM

• Like a saboteur in the night, *hard water* can stop vital war production. Eliminate hard water and you'll keep boilers in service longer; save 15% to 30% of your fuel; avoid costly shut-downs for repairs, turbining and cleaning; eliminate high-priced boiler compounds!

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Refinite Water Conditioning equipment is now used by scores of war plants and government installations. Available with selective-automatic valves, multiport valves or manual controls. Write for new catalog—today!

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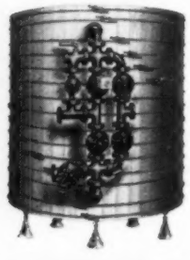

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more—still publicly prominent as the head of 500,000 dues-payers but a man whose influence was relatively slight by contrast with the dreams he must have had. For, in a sense, Lewis was back where he started.

Lewis was head of the Mine Workers at the start of the New Deal. He was the first national labor leader to sense the opportunity for labor organization which the New Deal provided even in the days of the NRA. He was then a man well along in middle life with no apparent expectation of rising much above the position he held. And the Mine Workers, at that time, were not outstanding. In the early years of his leadership, in fact, the union had steadily lost prestige and members, was down to an enrollment of about 160,000. Lewis, at the time, seemed a rather typical AFL leader, a not particularly active one. At conventions, he ranted picturesquely against the Communists. In politics he was an Old Guard Republican.

From the NRA days onward, Lewis became a changed, a strangely revitalized man. At AFL conventions he shouted for an end to craft union principles, preached industrial unionism incessantly, quarreled with his fellow leaders over the issues. In Washington he seemed to take new life from the crackling change of atmosphere about the White House. A frequent visitor there, and a welcome one, he "sold" industrial unionism, had much to do with the inception of the Wagner Act which, in turn, became an instrument of power for him to wield with dazzling effect.

There followed soon his estrangement from William Green, the UMW's departure from the AFL, the creation of CIO (with $1,665,000 taken as a loan from the UMW treasury) and the CIO's heavy financial backing of President Roosevelt's 1936 campaign.

With Roosevelt's landslide victory, Lewis stood at a new pinnacle ready to unleash the organizing forces which swept through the automotive, steel, and rubber industries amid the clangor of sit-down strikes and riots.

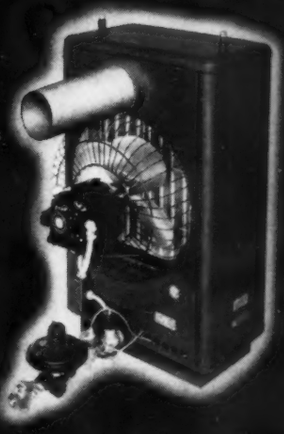
A Powerful Figure

By 1938, Lewis stood at the head of a lusty, gigantic new organization—a man of no one knew how much power. He gave orders to Congress, strolled in and out of the White House at will, was talked of as a possible candidate for the Presidency himself. To the press, his every word was news.

It would be hard to say today exactly when Lewis reached and passed his zenith. But somewhere along the way, he broke with President Roosevelt. Then followed a series of strategical mistakes, one of which was his stubborn adherence to isolationism—which made him a favorite of his Communist supporters in the days before the invasion of Russia and an enemy thereafter. Then came his colossal wrong guess on Wilkie and his dramatic renunciation of the CIO leadership.

Lewis left the stage with a flourish and history would remember him indulgently as a gladiator who left the arena glamorously—had he remained away thereafter. But there is a lot of the old trouper in John L. Lewis. He couldn't stay away. And his

REZNOR
Gas Unit Heaters



NOW AVAILABLE For War Production Factories . .

Restrictions on the manufacturing of Reznor Gas Unit Heaters have been removed by W. P. B. This action will not make heaters available to anyone other than armed forces and industries with high priority ratings. Thus, war factories may be provided with a system which saves 89% in vital materials. Reznor equipment also requires less installation time, and it economically moves more warm air over wider areas. Write today.

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GAS HEATERS EXCLUSIVELY
SINCE 1888

It's up to US...

First!

Strategically, the time might be right

THE enemies' over-extensions... the readiness of the "underground" and the guerrillas... the eagerness of our fighters — all the circumstances might be right... BUT —

The success of *this* year's offensive is up to *us*, all of us who read this magazine, who have the responsibility of *getting out the goods.*

Only when we have done our job can we hope to win.

Yale Pump Division Meets 1943 Schedules in 1942

Here at Yale & Towne's Pump Division, every man in our engineering department and in our shops knows that output considered good enough last December 6 is not good enough today.

We take pride in the fact that the war industries and our armed forces are receiving Yale Pumps at a rate we *had hoped* to reach in 1943! And standards of *quality* have been maintained throughout.

Today, the many cost-cutting, time-saving advantages of Yale Pumps are pledged to *victory*. Tomorrow, out of the trials and experiences of war, even more extensive peace-time uses for Yale Pumps can be foreseen.

TRADE **YALE** MARK

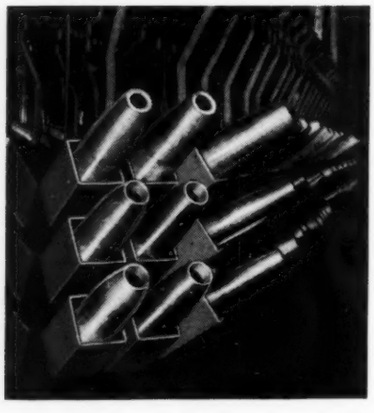
THE YALE & TOWNE MANUFACTURING COMPANY

Pump Division

212 HENRY STREET, STAMFORD, CONNECTICUT, U. S. A.

These Boys Need More Ammunition, Guns, Tanks, Planes!

Can Your Plant Beat Its Promise?



YOU HAVE probably surprised yourself, as well as the entire nation, by turning out more war products in your plant than you thought was possible.

But events are taking a new turn. More men are joining the armed forces. And fewer are left behind to arm them. Manpower is at a premium—and getting scarcer!

The Answer? It's Alvey-Ferguson "Endless-Stream" production through the use of Alvey-Ferguson *Scientifically Planned* Conveyors.

With months of experience in the science of Logistics during the First World War, it was no surprise to us to be called in to install A-F "Endless-Stream" Conveyors in so many plants now producing war products.

In many plants turning out shells, cartridges, machine gun barrels and other metal products that must be washed, we are also installing A-F Speed-Wash and Speed-Dry Machines to speed up production.

Whatever *your* material handling, product handling or metal product washing problem, our experienced engineers can solve it for you. Write, wire or telephone

The Alvey-Ferguson Company
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CONVEYING A-F MACHINERY

ALVEY-FERGUSON *Conveyors*
AND PRODUCTS WASHING MACHINES

life since then has been a series of attempts, each of diminishing importance, to recapture the spotlight.

Is Lewis through as a national figure? He doesn't want to be. Even now he is building up District 50 of the United Mine Workers as a sort of catch-all for industrial unionism of every kind. He would make of it a sort of new CIO. Through it he is attempting to raid established CIO and AFL unions, has even daringly sought to enroll the dairy farmers of upstate New York.

And some say he has still bigger plans, that he is clinging to his isolationship stand against the day when the war will end and the pro-isolationist pendulum may again swing his way.

But Lewis is in his middle sixties now—and the war may be a long one. Time is running out. The breaks are going against him. And the fading limelight finds the old gladiator back where he started, back among his own Mine Workers. That's where he's likely to stay.

•

Radio Series Aids War on Accidents

"Men, Machines and Victory," a radio program in support of the intensive "war on accidents" being carried forward by the War Production Fund to Conserve Manpower has been extended to December 25, thirteen weeks longer than the original schedule, as the Blue Network's contribution to the anti-accident drive.

Jane Cowl and other noted stage stars as well as leading industrialists will participate in the program which is heard weekly on Friday nights.

"The war on accidents has become a 'must' to save manpower for warpower," said William G. Chandler, chairman of the Fund's publicity cooperation committee in announcing the extension of the program. "Since Pearl Harbor, 14,500 workers have lost their lives—a free gift of American manpower to our enemies. Accidents on the production line can and must be stopped."

The War Production Fund is an activity of the National Safety Council, Inc., of 71 Broadway, New York.

•

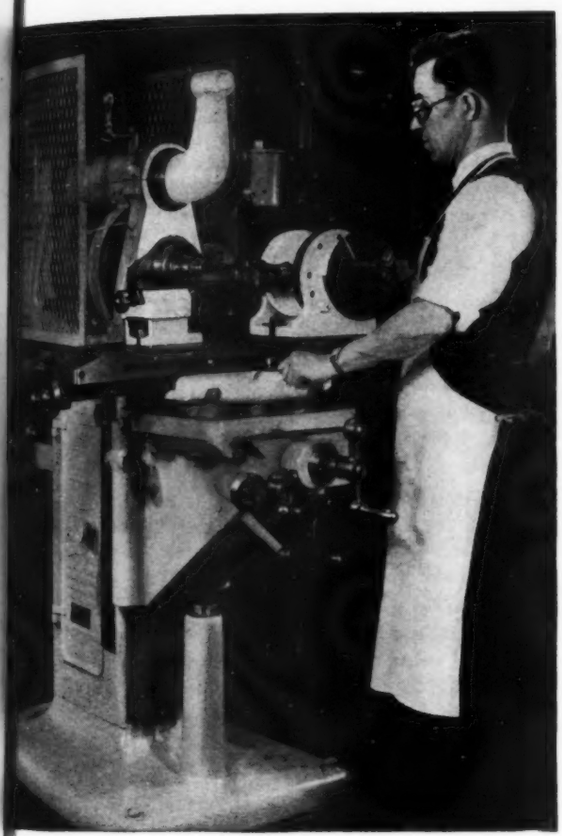
Engine Builders Show Axis-Beating Unity

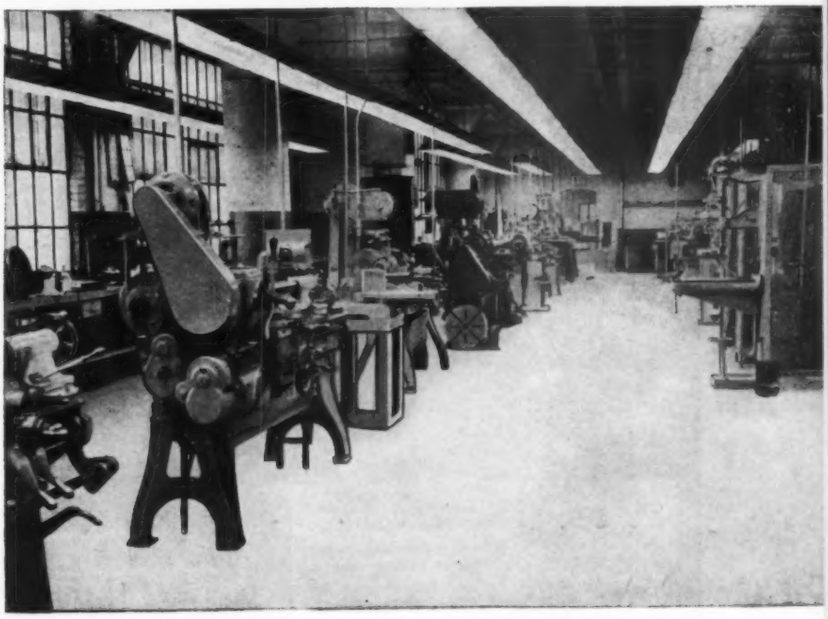
Three great automotive companies and an airplane engine builder are demonstrating the sort of American industrial cooperation which has enabled the United Nations to overtake Axis production so quickly despite a late start.

This example of Yankee teamwork is provided by the Buick, Chevrolet, and Ford companies working in close harmony with Pratt & Whitney of East Hartford, Conn. Suspending competitive secrecy for the duration, the automobile plants are manufacturing radial aircraft engines under

Du Pont Announces A NEW DEVELOPMENT IN "THREE DIMENSIONAL SEEING"

Recent studies reveal new methods of salvaging "WASTE LIGHT" *for Victory*





WHEN "THREE DIMENSIONAL SEEING" was introduced by Du Pont a year ago, a method was provided for obtaining strainless, full vision for machine operators by removing the "camouflage" ordinarily caused by dark, drab machinery. When machines are painted with high light-reflecting finishes of contrasting hues, they become "light reflectors" instead of "light robbers." Operators see their work clearly in *three dimensions.*

Now these principles are followed by hundreds of war contractors and applied at Government Arsenals and Ordnance Plants. Users report increases in production ... greater operating efficiency ... less fatigue ... fewer accidents ... and improved worker morale.

How scientific use of paint increases lighting efficiency

AS A RESULT of continued experiments, this new science of color and light now offers another important benefit to American industry—*maximum utilization of illumination.*

In many an industrial plant, a well-designed lighting system is robbed of its efficiency by dull, dingy ceilings, walls, floors and machinery. This results in a needless and dangerous "dimout" for the workers and an enormous waste of electrical energy.

Exhaustive experiments have shown that by painting all flat surfaces with high light-reflecting finishes, including the general surroundings as well as the machine area, *as much as 100 per cent more illumination can often be obtained without any change in lighting equipment.* Better seeing is the result. Safety is definitely improved ... production is increased.

It will pay to investigate this proven means of salvaging your waste light for victory! Mail coupon below.

Mail coupon today to E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. FM-112, Wilmington, Delaware

DU PONT

"THREE DIMENSIONAL SEEING"

I'd like to See:

- ☐ **Your latest booklet, "The Visual Way to Victory through Three Dimensional Seeing."**
- ☐ **The new film, "Salvaging Waste Light for Victory." Tell me how I may arrange for a showing.**
- ☐ **How "Three Dimensional Seeing" can be applied to my problems. Send me a Du Pont Service Engineer.**

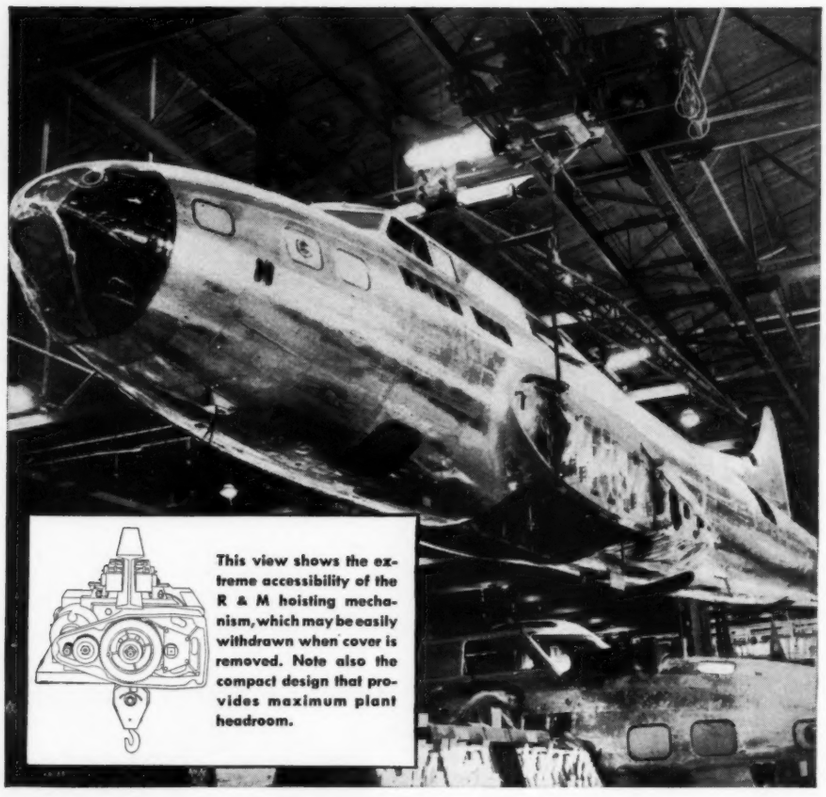
NAME _____ **TITLE** _____

COMPANY _____

ADDRESS _____

CITY _____ **STATE** _____

20 R&M HOISTS Speed this Firm's ★★★ War Work!



This view shows the extreme accessibility of the R & M hoisting mechanism, which may be easily withdrawn when cover is removed. Note also the compact design that provides maximum plant headroom.

THERE'S no time or labor wasted handling huge bomber assemblies in *this* great plant! A squadron of 20 R & M Hoists, mounted on American MonoRail cranes and tracks, keeps 'em moving at top speed.

Throughout the plant, R & M Hoists are on a three-shift schedule . . . in the hammer shop, foundry, anodic department, engine inspection, and even in the heat-treat room. On every job they are helping to *increase* production.

Here are just a *few* reasons for their outstanding utility and performance. R & M Hoists are *precision-built* from track to hook; they're powered by famous *R & M motors;* they're *perfectly balanced* to handle loads from any angle. There are hundreds of models, ranging from ½-ton to 7½-tons, to fit any application.

Whatever *your* hoisting problem, "take it up" with R & M! Our expert representatives will help you find the solution. Call the nearest R & M sales and service office, or write us at the factory.

R & M HOIST & CRANE SALES AND SERVICE OFFICES

Albany.....364 Broadway
Atlanta.....319 Walton Bldg.
Baltimore, Lombard & Concord St.
Boston.....55 Long Wharf
Buffalo.....2005 Delaware Ave.
Chicago....2400 W. Madison St.
Cincinnati.....418 New St.
Cleveland..352 Rockefeller Bldg.
Dallas.....1100 Cadiz St.
Denver.....1420 16th St.
Detroit.....2921 E. Grand Blvd.
Houston..3715 Harrisburg Blvd.
Jacksonville....305 Bisbee Bldg.
Newark.....700 Bergen St.
New York.....200 Varick St.
Philadelphia.....401 N. Broad St.
Pittsburgh..... H. W. Oliver Bldg.
San Francisco, 116 New Mtgmry. St.
Seattle.....216 Walker Bldg.
Syracuse....204 State Tower Bldg.
Montreal....Lyman Tube & Supply Co., Ltd.

ROBBINS & MYERS • Inc.

HOIST & CRANE DIVISION • SPRINGFIELD, OHIO

In Canada: Robbins & Myers Co. of Canada, Ltd., Brantford, Ontario

MOTORS • FANS • MOYNO PUMPS • FOUNDED 1878

license from Pratt & Whitney. In the assembly operation, a miracle of interchangeability of parts takes place which is described by the New York Times in a recent editorial as follows:

"These intricate mechanisms produced by Buick, Chevrolet, and Ford are shipped to the parent plant in Connecticut, torn down, and then reassembled, with half their complicated parts the product of the East Hartford plant and half the product of an automotive plant many hundreds of miles away.

"Then the composite engines are put through exhaustive test runs which they have passed with flying colors. Indeed they have not only passed the so-called 'green test' or first application of power; but, after being once more torn down and reinspected have been assembled in their composite form, undergone a final test run, and then been shipped for war duty. Such complete interchangeability of parts has only been made possible by remarkable cooperation between the engine manufacturer and its licensees. Already engineers and executives of the parent company have spent a total of nearly five man-years with the licensees and employees of the automotive plants making the engines have spent 102 man-years in special training and service-school work.

"The composite engines are a symbol of the extraordinary success with which the American spirit of teamwork has been applied between separate and normally highly competitive elements of the aircraft industry itself, between like factors in the automobile industry, and especially between the aircraft manufacturers and the automobile manufacturers, working toward a common goal. More than a symbol, engines and the other war goods thus produced by the subordination of separate interests to a common goal are a promise of the stuff of which victory is made."

•

Wood's Role Growing as Steel Substitute

The national effort to conserve steel by substitution has greatly increased the use of other materials—chiefly wood.

A recent WPB review of steel conservation discloses these changes in once-familiar designs:

Use of pressed wood (with steel only for strengthening frames) in the making of lockers for Maritime Commission Victory Ships. Over 25,000 such lockers will be built this year with a saving of 1900 tons of steel. Additional large savings will be affected in the manufacture of storage cabinets, lockers, and filing cases for naval vessels.

Use of wood, including wheels and axles, in the manufacture of wheelbarrows. WPB reported a saving of 321 tons of steel on an order of 8000 wheelbarrows for the Belgian Cõngo tin mines, and a vast saving in shipping space since the wooden barrows were shipped knocked down.

A wooden fence with sharply pointed barbs on top, as a substitute for chain link fences in certain situations.

Plywood folding chairs, made from scrap

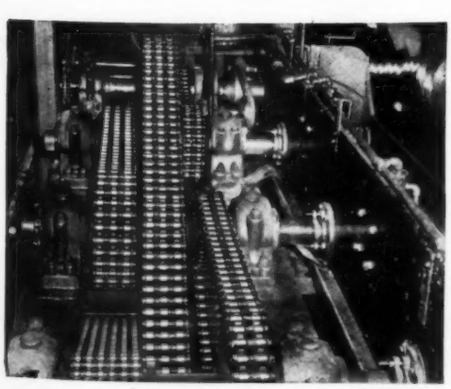
When Every Minute Counts

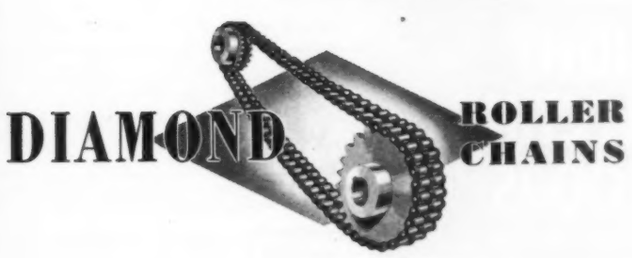
In war goods production, machinery drives that slip, that require more or less frequent replacement—or cannot be depended on to withstand shock loads . . . all cause delays or slowdowns in vital output. Failure or slipping of but one motor drive or the drives on any one machine may develop a production bottleneck in your plant.

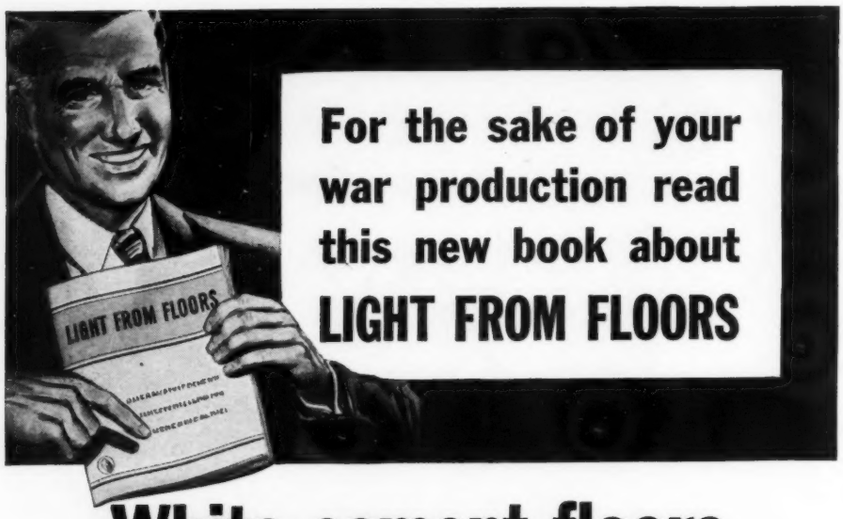
When every minute counts, continuity of operation is important, and here is where the uniformly dependable performance of Diamond Roller Chain Drives takes on new significance. These drives do not slip or creep, they keep the production machinery running continuously at the exact speed required for maximum output. They perform reliably even under adverse conditions; they have the tensile strength, the long life, the design required for peak production. Cushioned on hundreds of oil films between the roller bearing surfaces, Diamond Drives readily absorb shock loadings. Not being dependent on friction and rolling at many points of contact, bearing strains and maintenance troubles are insignificant.

The greatly increased use of Diamond Chains for industrial drives and for the scores of applications directly on war machines—tanks, planes, Naval and cargo vessels, catapults and ammunition hoists—has caused no variance from Diamond high standards of accuracy and uniformity so essential to dependability of performance.

The specialized experience in roller chain manufacture and application gained during over a half century is available to help speed the solution of your drive and power transmission problems. . . . DIAMOND CHAIN & MFG. CO., 449 Kentucky Ave., Indianapolis, Indiana. Offices and Distributors in All Principal Cities.







For the sake of your war production read this new book about LIGHT FROM FLOORS

White cement floors . make sharper, clearer sight!

TO INCREASE illumination and speed production, Boeing, Douglas, Consolidated and North American aircraft companies build light-reflecting floors made with Atlas White cement. They are easy to install, save more than they cost, and are simple to maintain.

INCREASE QUANTITY AND QUALITY OF PRODUCTION

Survey shows they reflect 61% more light than gray cement floor in same plant. This increases vertical illumination, eliminates gloomy shadows, and lights under side and vertical faces of work. Because of better illumination, accidents decline, rejects decrease, output rises.

EASY TO MAINTAIN

The light color enlivens the worker's attitude, promotes morale, encourages cleanliness. Maintenance is simple—frequent sweeping, occasional damp mopping, periodic scrubbing.

FOR NEW OR OLD FLOORS IN ANY BUILDING

Light-reflecting floors built with Atlas White cement are valuable wherever illumination, production, sanitation and safety are important—in factories, food plants, hangars, warehouses, laboratories, offices and apartments—and in corridors, stair wells and basements.

▶ For full details see new book, "Light From Floors." Send for it. Use the coupon. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York.

* * *

OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*

IF YOUR FLOORS ARE WHITE, YOUR PLANT GETS MORE LIGHT

LIGHT REFLECTING FLOORS MADE WITH ATLAS WHITE CEMENT

SEND FOR THIS NEW BOOK

Universal Atlas Cement Company
Chrysler Building, New York, N. Y.
Please send me copy of new book "Light From Floors."

Name_____
Position_____
Company_____
Address_____

F-F-5

wood left over from the manufacture of airplane wings and gliders. The Army purchased 1,600,000 of them.

Insect screening, formerly made of steel and copper, now made of waste from paper mills.

WPB also announced that 24,000,000 pounds of copper have been saved in the last few months by substituting silver for copper in electrical conductors. This would make 95,000,000 aircraft machine gun bullets, 600,000 anti-tank gun shells, or 1,500,000 anti-aircraft shells.

•

War Plant Is Fined $250 for Excessive Noise

Anti-noise ordinances are still being invoked successfully against industry in some parts of the country, despite the war emergency.

A plant in New York's Borough of Queens, the Frederick J. Valentine Company, was recently fined $250 in Long Island City court by Magistrate Savarese following a complaint by neighboring householders against the night-time use of heavy machinery whose vibration kept them awake. The company's attorney explained that the firm was working overtime on a Navy contract.

"Everything is not licensed by such a contract," the magistrate ruled. "Such work must be done within reasonable limits so that other war workers can rest."

•

Four Ships a Day Seen by January

Despite the fact that America's gigantic shipbuilding industry has been warned to expect the withdrawal of much of its manpower for service in the armed forces, it is expected to step up production to a rate of four ships a day by January, 1943.

That is the considered prediction of Rear Admiral Howard L. Vickery, vice-chairman of the United States Maritime Commission and deputy administrator of the War Shipping Administration. Right now a new ship is being delivered every eight hours, he said, adding that during the 30 days of September 93 ships, totalling 1,017,000 tons deadweight, were placed in service.

"That is shipbuilding—three ships a day, a ship every eight hours, 23.5 tons of new transportation capacity every minute," Admiral Vickers declared. "And in January you may expect nothing less than four ships a day."

Individual Gets "M" Award

Admiral Vickery also figured, soon afterward, in one of the most unusual ceremonies that has taken place in this country since the war began. This was the award of a Maritime Commission "M" for meritorious production to an individual.

The individual is William T. Morris, a

There's a Drafting Board

AWAITING YOUR SHEET STEEL PROBLEM

at BERGER

• If you have a problem concerning the design or engineering of sheet steel for high-priority production today—or for after-the-war markets—the place for it is on a drafting board at Berger.

Here competent craftsmen are ready to attack it with the experience and knowledge that has been acquired during more than 50 years of fabricating sheet steel.

During that half century, Berger has assisted many manufacturers in the improvement of their products—in helping to make them lighter, stronger, more efficient, more durable, more attractive and salable, more economical—through the application of sheet steel.

During that time, too, Berger has designed and manufactured a comprehensive line of standard sheet steel products on a quantity basis.

So, whatever your problem concerning the design and fabrication of products made of sheet steel, you may save considerable time and money by utilizing the experience and facilities awaiting you at Berger.

REPUBLIC STEEL — PRODUCTION FOR VICTORY

BERGER MANUFACTURING DIVISION
REPUBLIC STEEL CORPORATION
CANTON • OHIO
Culvert Division • Niles Steel Products Division
Steel and Tubes Division • Union Drawn Steel Division
Truscon Steel Company
Export Department: Chrysler Building, New York, N. Y.

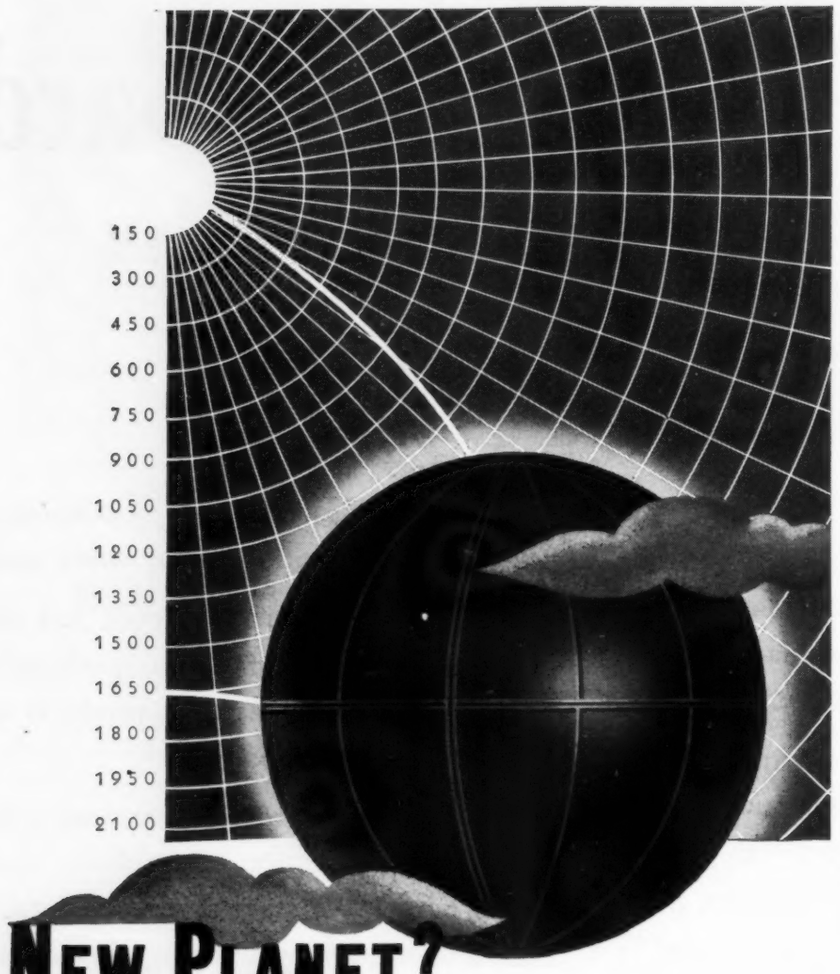
Merchandising Units • Cabinet Enclosures • Kitchen Cabinets • Building Products • Office Equipment • Lockers • Shelving

The items shown above are only a very few of the products which have been manufactured of sheet steel by Berger. There are many others on the complete list.

BERGER

DESIGNERS • ENGINEERS • FABRICATORS OF SHEET STEEL PRODUCTS

When considering sheet steel, remember these qualities: strength, light weight, durability, fireproof, versatile in design, variety of finishes, low cost.



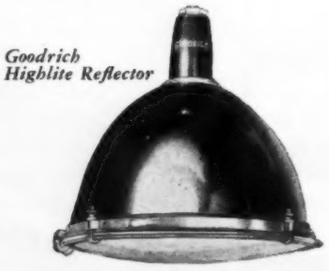
NEW PLANET?

NO. But new worlds of information are charted in this huge spherical photometer, which is one of the instruments used in the Goodrich laboratory for the measure of light in its manifold applications to industry.

Here at Goodrich, all interests converge on this one objective—*improvements in industrial illumination* through the development of fixtures to meet every kind of task and insure the clear, comfortable vision that means better work, done faster.

This modern laboratory, equipped with the most advanced scientific instruments, has given industry many notable achievements in lighting. Among recent developments is the new Goodrich Highlite Reflector, which delivers abundant illumination for large interiors without shadow or glare. It is but one of many hundreds of styles and sizes of Goodrich porcelain enameled lighting fixtures. Literature on request.

Protecting vital plants with floodlighting — saving man-hours in production — Goodrich industrial fixtures are serving America's war effort everywhere.



Goodrich Highlite Reflector

LIGHTING FOR INDUSTRY

GOODRICH ELECTRIC COMPANY

OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES AND FACTORY: 4604 BELLE PLAINE AVENUE, CHICAGO, ILL.

SOLD ONLY THROUGH ELECTRICAL WHOLESALERS

post-office employee of Rockville Centre, Long Island, who was cheered by 2000 persons when Admiral Vickery and other officials came to his modest home to raise the "M" flag on a specially constructed flagpole in his front yard. A parade preceded the ceremony.

Morris, not content with his eight-hour day of post-office duty, has set up a one-man war factory in the cellar of his home. There, working nights, he has labored prodigiously to produce 12,000 wooden spokes for ships' steering wheels.

"We honor today an American production soldier who has shown all of us what all-out war production means," Admiral Vickery declared. "It is the foresight shown by such men as Mr. Morris, and the hard work and elbow grease that goes into American production, which are proving to the Axis that, with their slave labor, they can never hope to produce on a par with free labor working in a free country."

•

Population Increase Rate Found Slowing Down

Current concern over manpower problems lends added interest to a recent report of the United States Census Bureau, forecasting a declining rate of increase in the total population as the war continues, despite a decided rise last year.

The Bureau set the population of the continental United States as of January 1, at 133,965,000. A sharp increase in the birth rate last year and this year is attributed to war re-employment and the draft. However, the Bureau expects the rate of increase to taper off decidedly as the war goes on.

"With several million men in the armed forces, many of them stationed abroad," the Bureau said, "the birth rate will drop abruptly as it did in the last war. During the course of the war, immigration either of citizens or aliens will practically cease; civilian emigration will be small.

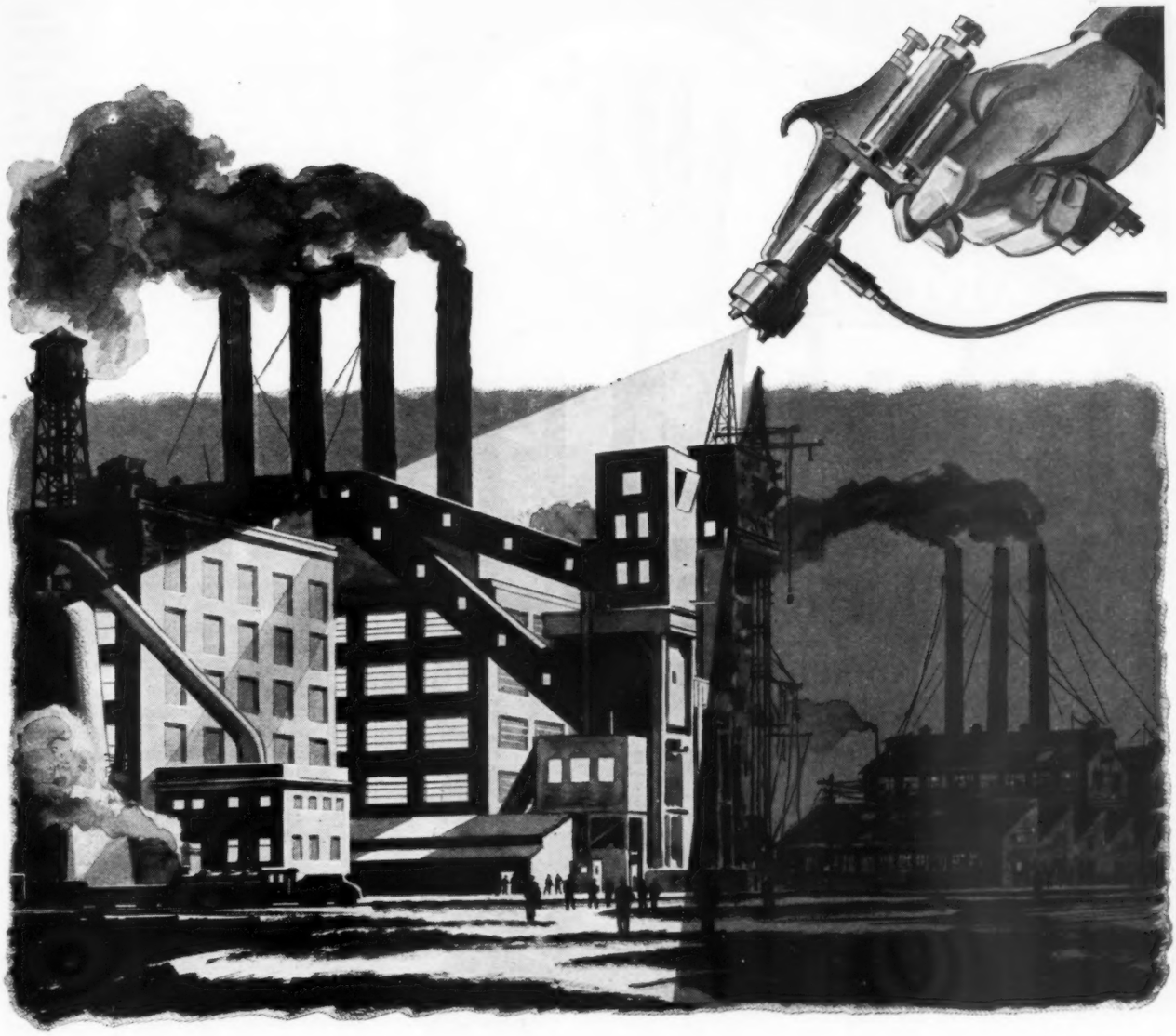
"The civilian death rate probably will not increase much in the next year or so, but military mortality is unpredictable. Population growth, therefore, will probably decline as the war proceeds."

•

Unions Seek to Change Overtime Pay Ban

National labor leaders, dissatisfied with President Roosevelt's executive order of September 9, abolishing premium overtime for Saturday and Sunday work falling within the 40-hour work week, are moving to change its effective application.

An order amending the original order now makes it possible for Secretary of Labor Perkins to approve exemptions if employers and employees re-negotiate existing contracts and come to an agreement on the payment of week-end overtime. The first such exemption was granted to



Conservation Corps...

Skilled painters in the role of an unofficial "Conservation Corps" can be of great service to you today in protecting your property, as well as maintaining the morale and efficiency of your man power.

FOR PROPERTY PROTECTION — a surface-saving treatment by Lowe Brothers Industrial Maintenance Paints will protect your property from the air-borne ravages of rust and oxidation, as well as sun, rain and snow.

FOR MAN POWER CONSERVATION —Lowe Brothers Industrial Maintenance Paints increase the light reflection value of wall, ceiling and work surfaces — reduce accidents, spoilage and rejects—step up production and conserve man power through better visibility and pride in machine appearance.

Let Lowe Brothers cooperate with you on an efficient and practical program of wartime painting:—

1. *To conserve your physical property.*
2. *To increase the productive efficiency of your irreplaceable man power.*

INDUSTRIAL SALES
THE LOWE BROTHERS CO.
DAYTON, OHIO.

Lowe Brothers

WARTIME MAINTENANCE PAINTS
AND WAR PRODUCT FINISHES

IN ACCORDANCE WITH U. S. GOVERNMENT SPECIFICATIONS

Announcing
M·S·A
FEND
BARRIER PROTECTION
for the worker's skin
AGAINST
INDUSTRIAL DERMATITIS
. . . Important news to every industrial medical director, safety engineer and plant executive concerned with checking the urgent problem of industrial dermatitis, and keeping men and women on the job without loss of time and production!
Distributed exclusively by the world's largest manufacturer of approved safety equipment, produced by intensive new research for better skin protection, M.S.A. FEND Creams and Lotions provide complete barrier protection against many-score specific skin hazards in industry . . . medically and cosmetically correct, non-toxic, safe and economical to use, uniformly effective on the job!
FEND Creams are pure white, easy to apply, and are bland and neutral. Each FEND product contains its own skin-conditioning factor. FEND Creams or Lotions are non-sticky, non-clogging, do not interfere with normal action of skin and skin glands, and are in many ways the long-sought preventives of skin dermatoses in industry.
WRITE FOR COMPLETE FEND FACTS!
Detailed in this 16-page FEND Bulletin is the whole story of Barrier-Skin Protection — MUST reading for everyone concerned with safer, better plant production today. Send for your copy!
FEND-L
FEND-O
FEND-I
FEND-X
FEND-E
FEND
MINE SAFETY APPLIANCES CO.
Braddock, Thomas and Meade Streets, Pittsburgh, Pa.
District Representatives in Principal Cities

1,500,000 American Federation of Labor building trades mechanics. This brought from Philip Murray, president of the Congress of Industrial Organization, a charge that Secretary Perkins was showing favoritism to AFL. One unit of CIO, the United Radio Electrical and Machine Workers of America took steps to have its members included in the exemptions.

In a letter sent to all its national and local officers, UREMWA said:

"If our companies desire to avoid confusion, disruption, and dissatisfaction among our people, and if they desire to maintain production at the highest possible level, the amendment to the executive order affords them an opportunity to show their good faith by joining in with the respective local unions in requesting that the existing agreements, voluntarily entered into by the company and the local unions, shall be maintained."

•

NIAA Launches "Victory Promotions" Campaign

The National Industrial Advertisers Association under the leadership of Wilmer H. Cordes, manager sales promotion and advertising of American Steel & Wire Company, Cleveland, has prepared a Victory Promotions Plan to coordinate the activities of industrial advertising men in their company's war efforts. The plan embraces four functions—War Production Promotions, Industrial Training, War Winning Advertising and Conservation and Salvage. Twenty-five regional chapters of the association with a membership of nearly two thousand have been invited to participate in this realistic program to increase the usefulness of advertising personnel by assigning their specialized skills to war effort problems.

Springboard of the campaign has been the issuance of a booklet describing the plan in detail. This booklet has been distributed to association members and with it a special outline to local chapters suggesting they set up local committees to help each other and gather case histories, take photographs, have exhibits, maintain scoreboards, establish contests, and keep records of accomplishments. Each chapter will keep a sample portfolio to be presented to the national headquarters on January 1, 1943, at which time an overall report will be issued on the success of the campaign.

Local chapters are requested to send to their members a questionnaire in which members are asked to report what their companies are doing to boost production by such devices as posters, bulletin boards, and contests. Questionnaire also inquires into methods used by companies for their War Bond, salvage, and industrial training programs. Advertising men are frankly asked if they participate in such activities in their company and given the suggestion that they make known to management their specialized ability to work with and successfully carry out morale promotion plans. Replies from these questionnaires will be tabulated and the results made known to all interested in the Victory Promotions Plan so there will be a stimulating exchange of information. It

I. B. Cranes Help America's Shipbuilders Keep Up Their Record-smashing Pace

authorities were placed on full alert in the area last night, following a report that a submarine had surfaced close to shore.

Maritime Record Being Set Today

(By Associated Press)

American shipyards today were to launch or lay the keels of ships numbering almost half the total of United Nations' vessels announced lost in the western Atlantic since Pearl Harbor.

Labor day was to see 174 new ships go down the ways and the keels of 49 others laid, setting a world's record for maritime construction. Two 173-foot steel submarine chasers were to be launched

Industrial Brownhoist Cranes are, today, playing a prominent role in America's shipyards from coast to coast. Their extra ruggedness, efficiency and operating speed is a vital factor in making the amazing production records possible. The patented Monitor-type cab on gas and diesel cranes through 40 tons capacity speeds up operator production by providing 360° visibility, better ventilation and less noise. Operating levers are conveniently placed for greater ease of control. Undercarriage, rotating gears, crab mechanism, power plant, boom and rigging are all designed and built to do a faster, uninterrupted job of material handling.

Whether you build ships or guns, tanks or any other vital products, it will pay you to operate an I. B. Crane. Write today for further facts.

THROW YOUR SCRAP INTO THE FIGHT!

INDUSTRIAL BROWNHOIST

BUILDS BETTER CRANES

INDUSTRIAL BROWNHOIST CORPORATION • GENERAL OFFICES: BAY CITY, MICHIGAN
DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

In War Time, It's . . .

FLEXPEDITE

★ **Achieve design flexibility, conserve vital materials, speed conversion, assembly and production by utilizing flexible metal connections—specifically..**

REX *Flexible* METAL HOSE

Units Shown are Typical Vari-formed Assemblies.

The many production types of REX Flexible Metal Hose offer the widest range of adaptability—for simplifying re-design problems where space limitations and flexibility are imperative—for conserving more critical materials—for solving every kind of fluid and gas handling problem.

REX Flexible Metal Hose speeds manufacture by facilitating assembly. It can be bent to position or "snaked" into place and coupled in a fraction of the time required to fit multi-plane pipe connection. Easily attached fittings for every requirement. REX Flexible Metal Hose withstands severe flexing and vibration. All in the interest of war time economy.

FLEXPEDITE *YOUR* PRODUCTION

Write for data and engineering recommendations on specific problems involving flexible connections.

REX-WELD Corrugated Flexible Metal Hose • REX-TUBE Interlocked Flexible Metal Hose
REX-FLEX Stainless Steel Flexible Tubing • AVIOFLEX Oil Line Hose • CELLU-LINED Hydraulic Hose

Copyright, 1942, Chicago Metal Hose Corporation, Maywood, Illinois

CHICAGO METAL HOSE CORPORATION
General Offices: MAYWOOD, ILLINOIS
Factories: Maywood and Elgin, Ill.

is the purpose of NIAA to give to all advertising men free access to the work of others whose successful programs have contributed to helping win the war on the production front.

Announcing the plan to his associates, Cordes stated, "The entrance of manufacturers into lines not even remotely associated with their normal products, and the many internal wartime promotion needs, have brought new problems to management and advertising men. Those responsible for the conduct of the war and the supplying of unprecedented amounts of materials have been warm in their praise for the work advertising men have done to boost production output. They recognize that machine speed alone will not produce goods at the needed pace, but that output also depends upon the will of the worker to produce at top speed.

"The building of this important morale is a job for the advertising man. He has the creative imagination and the psychological understanding for such a task. He is a trained specialist. He knows how people react to certain stimuli and how they resist being pushed around.

"Working largely independently of one another, advertising men throughout the country's war production plants have been carrying on programs of morale, employee training, salvage, War Bonds, and production drives. With the Victory Promotions Plan they can pool their experiences and ideas and participate in a broad over-all, nation-wide program of getting the most effective techniques into action in as many plants as possible."

Assisting Wilmer H. Cordes in this campaign are four subchairmen:

Morgan Fenley, director of publicity, Eaton Manufacturing Company, Cleveland, has charge of War Production Promotions, which embraces plant posters, production drives, contests, suggestion boxes, house organs, and all other plans for increased plant production. Lansing Moore, vice-president, Holden, Stedman & Moore, Inc., Detroit, heads up Industrial Training, which covers the methods used to train new employees, and means of shortening the period of training. Edward H. Peplow, Jr., manager of sales development, John A. Roebling's Sons Company, Trenton, N. J., has the War-Winning Advertising division, which will help advertising men decide how they can advertise effectively during war times, the conclusions being based upon successful methods used by other concerns. Walter H. Gebhart, manager of sales, Industrial Division of Henry Disston & Sons, Inc., Philadelphia, has the Conservation and Scrap Salvage portfolio and will tie in the national campaigns of the government with the individual drives in each advertising man's own plant.

Herbert V. Mercready, sales promotion manager, Magnus Chemical Company, Inc., Garwood, N. J. is president of the association. Chapters are located in Baltimore, Boston, Chicago, Cincinnati, Cleveland, Columbus, Detroit, Indianapolis, Los Angeles, Gettysburg, Milwaukee, Minnesota, Montreal, Newark, New York, Philadelphia, Pittsburgh, Rochester, Rockford, San Francisco, St. Louis, Toledo, Toronto, Hartford, and Youngstown.